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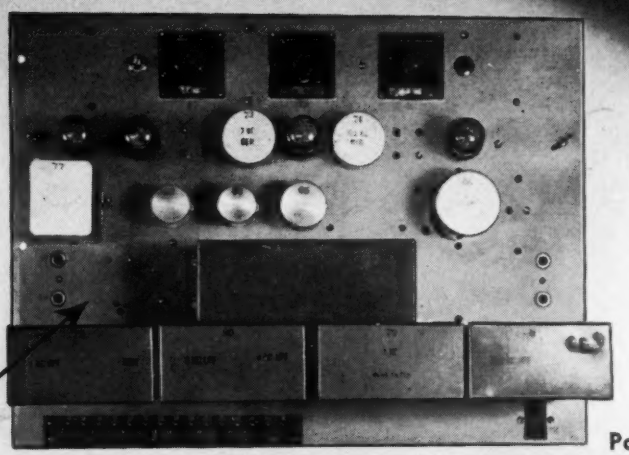
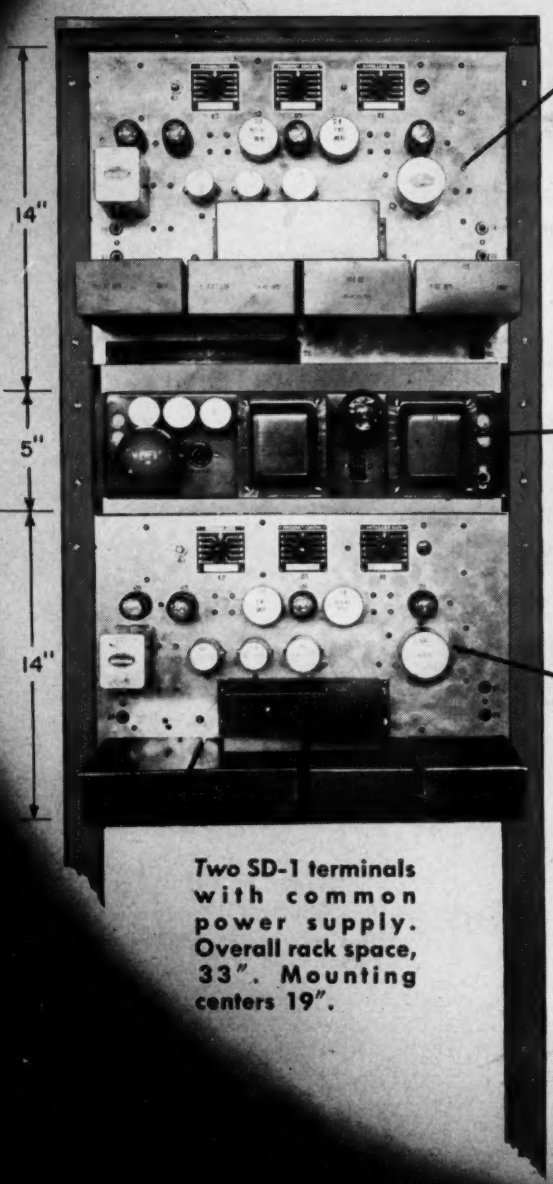


Front view of SD-1 short haul carrier terminal.



Two SD-1 terminals with common power supply. Overall rack space, 33". Mounting centers 19".

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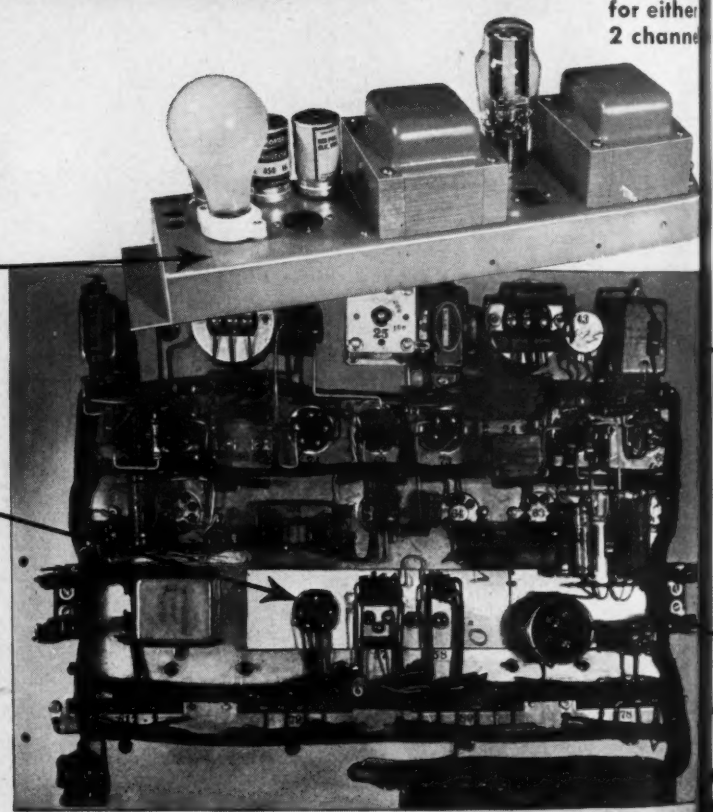

SD-1 short haul carrier terminal, rear view.

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The construction of manual and machine tools and the manufacture with their aid of small articles and bulk commodities is generally highly localised; its situation is controlled by the presence of a coalfield, a mineral deposit or the like.

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FLASHES AND PLUGS

SUPER SERVICE, IF YOU PLEASE. Parisians who wish to glean such diversified bits of information as how many legs a centipede has or the political and economic structure of the ancient Inca Empire can get the answers P.D.Q. by dialing "SVP," according to the September issue of *Magazine Digest* whose authority is the French publication, *Realites*.

The initials stand for "Sil Vous Plait," an organization which employs more than 1,000 workers, ranging from filing clerks to specialists in Sanskrit. Three hundred telephone lines serve Paris and its suburbs, and since the war, branches have been established in Marseilles, Lyons, Lille and Bordeaux. A branch is also in operation in Morocco and others will be opened soon in Algeria and Tunisia, the article states.

"SVP" had its beginnings in Paris in 1935 when a group of professional men, including Dr. Rene Saunier, discovered there was no champagne for their dinner, and the wine shops all were closed. Dr. Saunier thought it might be a good idea to start a company that could supply wines whenever ordered by telephone, so pooling his resources together with a lawyer, a scientist and two newspaper publishers, they began SVP.

Originally anyone could use the service and the charges were added to his telephone bill. In 1938 when SVP expanded services to include an information bureau, it enrolled special subscribers and today some 25,000 Parisians are listed as regular subscribers and an additional 10,000, mostly businessmen or executives, subscribe to a special priority service.

Fees range from 125 to 2,000 francs a month and are added to the regular telephone bill. The telephone company receives a small percentage of SVP's income.

To receive and channel the calls, the following system is used: When a subscriber calls in, six operators are ready to receive it; the team is doubled in rush hours. When the type of question is known, the operator directs the call to one of SVP's 26 specialized services.

• • •

WHAT THEY'RE READING. Most popular in the collection of American books transferred from the now closed U. S. Information Library to the Melbourne (Australia) Public Library, believe it or not, is the Manhattan telephone directory, Melbourne librarians reveal.

• • •

TURN ABOUT. Moving day for the business office of the British Columbia Telephone Co. gave its officials a keener appreciation of the difficulties of would-be subscribers to get telephones installed. When the company moved its office to a new building, it discovered that no telephones had been installed and no wiring provided for their connection.

For a day or so, the company appeased scores of incoming calls to the commercial staff, saying that connections to the business office had been disconnected temporarily. The mechanical staff were busy in the meantime running necessary wires and installing the new telephones.

• • •

SWEET SURPRISE. Half a bushel of bees and 20 pounds of honey were removed from a telephone connecting box at Perry, N. Y., recently when telephone men called an expert after the bees prevented their connecting new telephones. The expert found the swarm could not be captured and administered lethal gas.

TELEPHONY

The Journal of the Telephone Industry

October 11, 1947

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MODULATION IN COMMUNICATIONS

By FRANK A. COWAN
Transmission Engineer
American Telephone & Telegraph Co.

ANY signaling system requires some means for introducing a change in conditions at the sending end which may be recognized at the receiving end. The process by which the conditions are changed has come to be called "modulation." There are many varieties of forms of change as well as a large number of conditions which are subject to change in response to the signals to be transmitted.

In early systems for communication at a distance, the signal information might have been impressed upon a rising column of smoke, a light, a stone tablet or a sheet of parchment. For modern communication, wide use is made of systems in which the signals change the magnitude or condition of electric energy.

Starting with the electric telegraph a little more than 100 years ago this medium of communication has grown steadily more important and more complex. To meet a variety of needs many systems of modulation have been developed and papers describing them in detail are available in the technical literature. Various aspects of the modulation processes have been analyzed and presented carefully and some of the earlier conceptions have acquired a classical textbook status. Recent trends have placed emphasis on modulation systems which may more readily be understood when viewed in a somewhat different manner. It is the purpose of this paper to present certain conceptions which may facilitate the understanding of the various systems of modulation and permit an improved perspective.

Types of Modulation

Communication by electrical means depends upon wave transmission. The information carried by a wave is determined by the manner in which the instantaneous wave magnitude varies with time. All modulation systems depend upon changing in some way this relationship between magnitude and time. The early telegraph and telephone systems employed a change of amplitude in response to the signals. While most of the present day systems also depend upon amplitude changes of some form there are also a large number of systems in which the amplitude of the waves is not changed and the intelligence is transmitted by changing the relative phase or time of occurrence of some periodic wave condition. Since the frequency of a wave is merely the rate at which a periodic wave recurs, a variation in the relative time of occurrence represents a change in frequency as well as phase.

Systems of modulation which employ amplitude changes may be broadly designated as "amplitude modulation" systems. Those employing changes in time of occurrence may be designated as "frequency modulation," "phase modulation," or "time modulation" systems.

Modulation to Change the Signal Medium

Translation of signals from one medium to another involves modifying conditions in the new medium in response to those existing in the originating medium. The electric signals produced for transmission from one point to another are converted from acoustic signals in the telephone, from mechanical signals in the telegraph and teletypewriter, and from light signals in television and telephotograph systems. At the receiving point another step of modulation or what is termed "demodulation" changes the signals back to the originating medium.

When, as is usually the case, the electric signals are produced by changing the magnitude of an otherwise unvarying quantity, such as might be produced by a direct current or voltage, the electric signal frequencies are the same as those in the originating medium. These frequencies are called "keying," "audio" and "video" frequencies for the telegraph, the telephone and television, respectively. The term "base band frequencies" has recently come into use as a general term describing frequencies of this class.

When, however, the electrical quantities which are modified are changing periodically over a range of conditions, such as those produced by an alternating current, the signal frequencies resulting from the modulation are different from those in the originating medium and fall in the frequency range above and below the frequency of the unmodulated condition. The bands in which these frequencies fall are the well known "upper sideband" and "lower sideband" and the frequency around which the bands are disposed is the "carrier" frequency. Regardless of the method of modulation the side frequencies are displaced from the carrier by intervals equal to the signal frequencies or harmonics thereof.

The terms "modulation" and "carrier" came into general use when the first carrier and radio-telephone systems were being developed. The use of devices in which modulation changed the signal medium antedated the use of modulation to change signals from one location in the electrical frequency spectrum to another, and as a result is not generally thought of as modulation. Similarly, the idea of a direct current being a carrier current with zero frequency is even less frequently encountered. Although these conceptions are sometimes helpful in a broad overall consideration, it is the present accepted practice to consider as "carrier systems" only those systems in which the frequency being modulated is other than zero. Those systems in which the carrier is effectively a direct current are known as "direct current systems" in telegraph, as "voice" or "audio frequency systems" in telephony, and as "video systems" in television.

Modulation in the Telephone Transmitter and Receiver

In most telephone instruments the variation in resistance of the carbon

granules in the transmitter in response to the impressed speech determines the value of a direct current. One arrangement used in supplying the current is indicated in *Fig. 1a*. If this direct current were converted into an alternating current by the introduction of a pole changer in the manner shown in *Fig. 1b*, the result of impressed speech would be amplitude modulation of this alternating current. The signal message then would be carried by the upper and lower sidebands of the frequency produced by the pole changer.

In the usual telephone receiver a magnetic field produced by the signal currents interacts with the field of a permanent magnet to produce forces on the diaphragm which reproduce the speech. If the permanent magnet in the receiver were replaced by an electromagnet which was supplied with an appropriately phased alternating current of the same frequency as that supplied the transmitter by the pole changer the receiver would reproduce the impressed speech from the signal sidebands produced by modulation at the transmitter.

As an alternative to this arrangement it would be possible to introduce a pole changer at the receiving end which in effect would rectify the alternating current signal and then operate in the usual manner on the telephone receiver. It is this arrangement which is indicated schematically in *Fig. 1b*. The difference between the telephone system employing voice frequency transmission and that employing transmission over an alternating current carrier for a single channel is merely that of introducing the appropriately phased pole changers at each end of the circuit.

Types of Signals

The type of modulation employed frequently depends upon the nature of the signals it is desired to transmit. Signals introduced into a communication system may be divided into two broad classes—types with a limited number of conditions and types with an unlimited number of conditions.

The first category includes the two-condition type of signals used in most telegraph and supervisory circuits. The two-condition signals such as open or closed, marking or spacing, on or off and positive or negative may be designated as "yes or no" signals. Special codes with more than two conditions are sometimes desirable. The synchronizing signals in television transmission with three amplitudes or conditions are an example. Two of the amplitudes correspond to each of the extreme picture conditions of black and

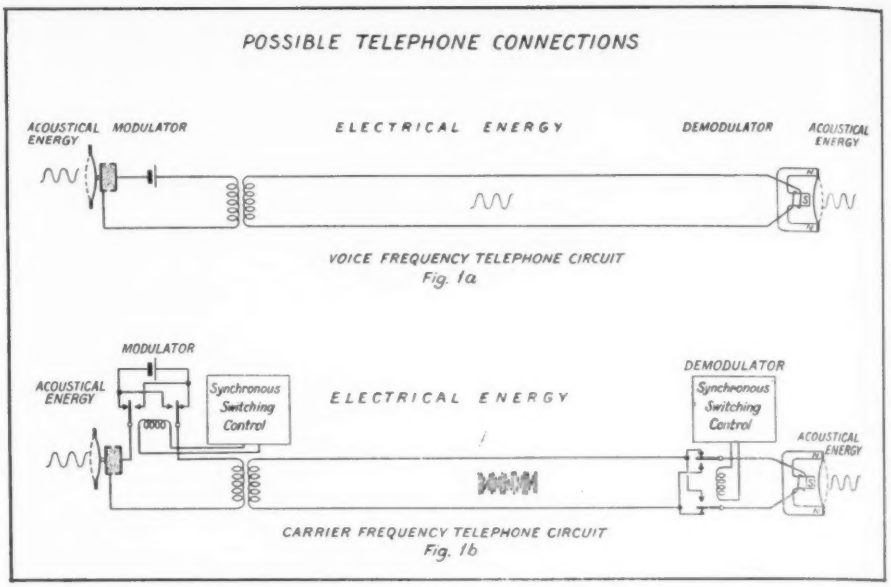

Fig. 1. Possible telephone connections.

Fig. 2. Instrumentalities used for modulation.

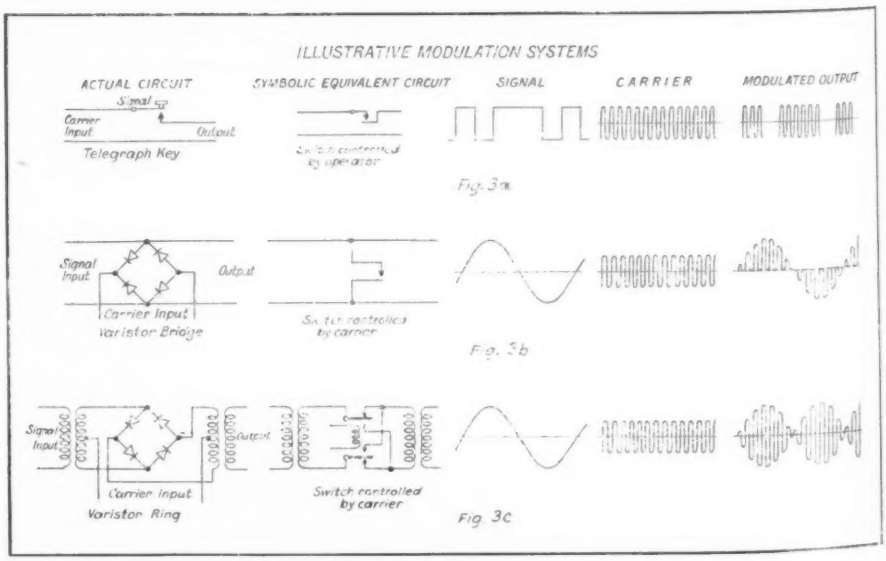

Fig. 3. Illustrative modulation systems.

white while the third is a higher amplitude.

The second category includes unaltered signals from a telephone, and those produced by scanning pictures for transmission over a telephotograph or television system. Here it is desirable to transmit a wide range of finely graduated tones or conditions. Since there is a limit to the extent to which fine gradations can be resolved or appreciated, it is possible to convert signals of the second category into signals of the first category.[1, 2] In this alteration it is necessary to retain a sufficient number of gradations to insure acceptable reproduction at the receiving end.

Another characteristic of signals which is important is the rate at which the different conditions need to be transmitted. This rate of change of conditions may be relatively slow as in manual telegraph or exceedingly rapid as in the transmission of a television picture. The required rate of change determines the minimum frequency band width necessary for the signal transmission.[3] The width of the required signal band may be altered significantly by changes in the form of signals to be transmitted. For example, the 32 characters of a teletypewriter might be represented by 32 gradations in amplitude of a current, and only one of these gradations would need to be transmitted for each character. If, in order to differentiate with greater certainty between the different characters, it were found desirable to change to a two-condition "yes or no" type of signal, a permutation code having five "yes or no" sequential conditions would be necessary in order to represent a total of 32 characters. Thus, in order to obtain greater certainty of correct recognition of conditions, the rate at which the different conditions must be transmitted has been increased five-fold, with a corresponding increase in the minimum band width required for the same speed of character transmission.

In the same way the representation of the gradations in amplitude of speech by a "yes or no" code, such as is used in pulse or pulse counting systems, requires a seven-fold increase in minimum signal band width where 128 gradations of amplitude are transmitted.[1, 2]

Signals which have been resolved into the "yes or no" type with an accompanying change in the minimum band width required, do not necessarily represent the limiting extent to which signals can be changed in order to obtain greater certainty of correct reception. It is usually not necessary to make further changes in signal types but there may be instances where the adoption of more elaborate measures are desirable. Such a case is encountered in telegraph where there has been a practice of occasionally repeating messages.

Mechanism of Modulation

Any mechanism which will produce the desired changes in conditions in response to signals may be employed for modulation. The variable frequency oscillator used in transmission testing work furnishes an example of two types of modulation by manual control. Frequency modulation may be accomplished by turning the frequency adjustment dial and amplitude modulation accomplished by turning the output or volume control dial.

So long as the signaling speeds are low, mechanically controlled switches, commutators, relays, potentiometers and variable condensers may be satisfactorily used. For higher signaling speeds variable impedance elements such as vacuum tubes, rectifiers, and varistors may be arranged to form networks which will accomplish the desired changes in response to the signals. Some of the instrumentalities used for modulation are shown on the photograph designated as *Fig. 2*. The changes introduced by the modulating circuits may be gradual over all or most of the range, or may be abrupt. An effective design is usually one in which the character of change is abrupt and approximates a switch.[4] In the analysis of such circuits it is often convenient to assume the elements to be replaced by equivalent switches capable of operation at the required speed.

The versatility of switching type modulators is interesting. A simple switch can be an effective modulator—the telegraph key, such as shown in *Fig. 3a.*, being one example. Circuits with this abrupt control are not limited to on or off type of control for "yes or no" signals but may be used with signals having an unlimited number of signal conditions. A switch or its equivalent, arranged so that it closes on one polarity of a carrier current and opens on the opposite polarity, will serve as an efficient amplitude modulator for speech and other types of signals. One widely used arrangement of this type is the varistor bridge modulator shown on *Fig. 3b.*[5]

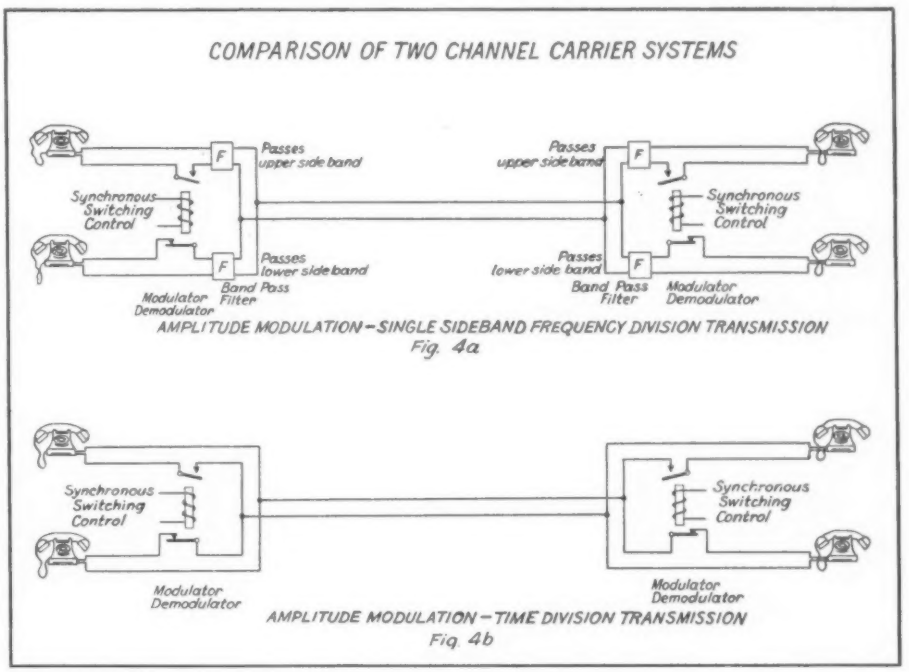

Fig. 4. Comparison of two-channel carrier systems.

The switching action of the bridge-type modulator results from the variable impedance of the varistors forming the bridge.

When the polarity of the carrier is in the direction in which the varistors conduct readily the current flow causes the effective impedance to drop to quite low values, thus effectively placing a low impedance across the circuit. When the polarity is in the opposite direction the impedance of the varistors is quite high, the impedance of the circuit is effectively high, and there is a negligible bridging effect which corresponds to the open condition of the switch. The signal in this case is alternately passed and suppressed, and the resulting output contains, in addi-

(Please turn to page 17)

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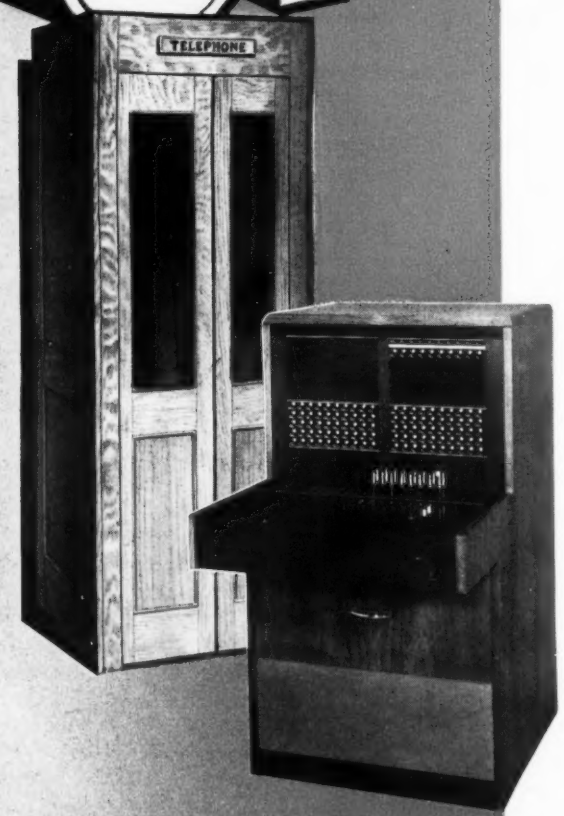

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tion to the signal, the amplitude modulated double sidebands of the carrier frequencies and its harmonics. Since frequency or phase modulated signals may be developed from sidebands originally created on an amplitude basis, the simple switch may be used for frequency modulation.[6]

The ring or reversing switch type modulator shown in *Fig. 3c* also depends upon the variation in impedance of the varistors. The circuit is so arranged that on one polarity of the carrier one pair of diagonally opposite varistors is low in impedance and the other pair is high. The reversal of this condition for the opposite polarity furnishes the effective reversal of the polarity for transmission through the modulator. This pole changing type of modulator has the advantage of placing the signal carrier and output terminals in a conjugate relationship, thus effectively limiting the output to the modulation products.

Two amplitude modulating switches arranged so that one switch is open while the other is closed and vice versa will permit signals from two separate channels to be connected to a line on a time division multiplex basis.[7, 8] If the switches are biased in such a manner that they are closed for a much shorter length of time than they are open, a number of such channels may be interleaved on a time division basis. The switching required for time division multiplex may be done with relays, mechanical commutators, special vacuum types with electric beam commutating, or with amplitude modulators employing varistors, crystals, or vacuum tubes to act as "gate" circuits under the control of switching currents.[9, 10]

Two switches under the control of "yes or no" signals may develop frequency shift modulation if these switches were arranged so that under one condition of signal one frequency would be connected to the circuit, and under the other condition the other frequency would be connected.[11]

A switch, or a circuit equivalent to a switch, may be caused to generate pulses and, by proper control of the timing the various forms of pulse modulation may be generated. In pulse position modulation a pulse is generated once during each of a succession of fixed time intervals. The instant of generation within the interval is determined by the impressed signal. The usual arrangement is to have the operation retarded for one polarity and advanced for the other polarity of the signal, the degree of advancement or retardation being controlled by the amplitude of the signal.[12, 13]

It is an interesting fact that the output of a pulse position modulator represents a frequency or phase modulation of the switching frequency.[14, 15] The harmonics of this switching frequency which are generated by the abrupt switch operation also carry phase or frequency modulation so that still another means of deriving frequency modulated signals from a simple switching operation is available. The harmonics which are assumed to be used in this case would in other cases represent unwanted modulation products which may be readily removed by filters, since they fall well above the wanted band.

Modulation Products

Unwanted signal or modulation products in the modulator output are not objectionable as long as they can be removed by filters. However, in some cases the signal and carrier frequencies are so related that unwanted products may fall into the same band as the wanted products. Unwanted signal and carrier frequencies may be greatly reduced by the use of balanced ring type modulators, but this does not eliminate those modulation products associated with harmonics of the carrier. Since these arise from the abrupt switching action, removal would require that the switching operation be performed in such a manner that the current ratio corresponding to the transmission of the signal through the modulator would be a linear function of the instantaneous carrier magnitude.[16] Modulators of this type are difficult to achieve and for most situations would have no significant advantage. Such a modulator would be a so-called pure product modulator and the classical mathematical expressions for the product of the signal currents and a sine wave representing the carrier would be rigorously correct.

A rigorous mathematical analysis of the type of modulator with abrupt changes can be made by classical methods if the carrier is represented by a Fourier series determined by the current ratio of the signal transmission through the modulator as a function of time. This quantity when combined with the signal currents on a product basis will give the output currents.

Such an analysis will show that a signal introduced into a switching type modulator circuit, in which the switching is controlled by a carrier, will produce sideband modulation products associated with the fundamental carrier frequency which are essentially the same as those which would result from a pure product modulator supplied with the same signal and a pure sine wave of the carrier frequency. A quite different result would be obtained if the signal and carrier were interchanged. This results from the unwanted harmonics occasioned by the abrupt changes falling well above the wanted products in the first case and falling within the wanted band in the second case.

Although it is convenient to think of the carrier being modulated by the signal the actual process by which this is accomplished is for the carrier to modulate the signal.

Similarities Between Different Types of Modulation

The fact that the more important types of modulation can be produced by somewhat similar circuits indicates that the various types are rather closely related. There are certain other interesting relationships.

About 30 years ago Carson demontrated that either of the two sidebands resulting from the amplitude modulation of a carrier conveyed all of the information present in the signal, and that it should be sufficient to transmit only one of these sidebands over the communication system.[17] This has resulted in the wide use of single sideband transmission where two channels can be transmitted within the band which would be occupied by the double sideband signal corresponding to one channel.[18, 19] The manner in which such a two-channel system could be set up is indicated schematically in *Fig. 4a*. This type of multiplex operation is commonly called "frequency division."

Two channels also could be obtained by the time division method with amplitude modulation. The schematic arrangement for such a time division system is shown on *Fig. 4b*. Used separately, each of these time division channels is not different from a double sideband amplitude modulation system with a carrier frequency determined by the switching rate. When they are combined for transmission over the line, the frequencies of the two channels fall into the same band. They are, however, so related in phase that they may be separated at the receiving end on a time division basis.

As is indicated on the chart the elements of the two types of two channel systems may be identical except that in the frequency division case single sideband filters are introduced to accomplish division by this means.

One factor which has occasioned the use in telephony of single sideband systems in preference to time division amplitude modulating systems is the extreme precision in attenuation and phase response required in time division to keep interchannel crosstalk at

(Please turn to page 38)

IN THE NATION'S CAPITAL

BY
FRANCIS X. WELCH
WASHINGTON
EDITOR

Utilities must sell the people on the need for higher rates. . . . Convincing commissions of need is not enough, for any company that "neglects to sell its own customers is heading for some hard times."

IT WAS a good party over at Joe and Mabel's place last week. Everybody enjoyed themselves except the telephone company which was not present. But the telephone company was actually the inspiration for the gathering because it has had the temerity to ask for increased rates from the local public service commission.

The increased rates would amount to about 25 cents a month on everybody's bill in town and it got Joe pretty mad when he heard about it.

This fellow Joe—you do not need his last name because there is one in every town and often one in every block—is quite a character. He is perpetually protesting about something or other. And for a fellow who worked his way up from the other side of the tracks, selling junk as a kid, to one of the top jobs in one of the successful unions, with a big beautiful house, wife, and kids, and car (all big and beautiful), Joe is the most dissatisfied fellow on earth.

There is nothing in this country or out of it that seems to suit him. Before the war he was always indignant about the way Hitler was carrying on in Europe. Then, during the period when Hitler signed the peace with Stalin, Joe was always mad at our government in Washington for "warmongering." But when Hitler went after the Reds, Joe could not get this country into the war fast enough.

Since then Joe has been in a perpetual state of indignation about something or other: Franco in Spain, getting rid of the OPA, price control, public housing, aid to Greece, and the Taft-Hartley Act, which Joe refuses to call by any other name except the "Slave Labor Act." You would imagine from all this that Joe had a pretty low boiling point. And that is the truth. When he picked up the paper and found out that the telephone company wanted to sock him an extra 25 cents a month for telephone service, Joe was so surprised that his two-bit cigar fell right out of his mouth.

"This is the limit," said Joe to his wife who had been dreamily weighing the pros and cons on the new hem-line styles. "These monopolists have gone far enough. I am going to protest this latest graft. I am not going to pay it. I am going to organize a rebellion."

Organizing a rebellion has become such a routine around Joe's house that Mabel went right into her act without even snuffing out her cigarette. She began to call all the boys and girls on the telephone. (Joe has an unlimited phone and does Mabel get her money's worth out of it!)

"Another protest meeting for tomorrow night. . . . No, not the 'Slave Labor Act' this time, something new and very oppressive. I am not quite sure what it is; when you get here, Joe will tell you all about it."

So, the gang showed up the next night and Joe read the riot act to one and all about the perfidy of the telephone company.

Mabel served some delicious pastrami, corn beef and fancy cheese sandwiches, from the new delicatessen downtown, which must have set Joe back a sawbuck for the meat alone, and before the clock struck 12, Joe and the rest of the gang really had the telephone company lying on the floor bleeding and crying for mercy (figuratively speaking, of course). Resolutions were passed and, as a gesture of cooperation, somebody also passed the hat. About $25 was collected to be turned over to a lawyer who would use that as an opening fee to file a protest against the rate increase. Joe said his union had a lawyer who would start off at such a modest fee for old times' sake.

The party broke up about 2 a.m. with nobody feeling any pain. Including refreshments, smokes, and the war chest collection, the evening probably added up to as much as $100. But Joe said it was worth it to keep those dirty monopolists downtown from getting that extra 25 cents a month on the telephone bill.

One little fellow, named Mike, pointed out that the prices of everything else had gone up, including wages—thanks to some good union leading by Joe. Since there had not been any change in telephone rates around town in 20 years or more, Mike wondered whether the telephone company might not be entitled to an extra two-bits. But Joe squelched him. "You are talking like a Fascist, Mike," he said, "and if you don't look out that kind of talk can get you in a lot of trouble."

Mike shut up after that because when Joe talks about making trouble for somebody, he can really do it. Nobody can get a job in this town or keep much of a one if he is on Joe's black list.

All told, the party over at Joe and Mabel's amounted to enough to pay the proposed increase on the telephone bill, for everybody present at the party, for about 10 years. But this is just a starter. There is going to be another party next week and probably another after that. Joe says he is not going to let the telephone company get away with this "inflationary stuff."

• • •

The above account may seem a bit exaggerated, but it does point to a serious problem in public relations which the telephone industry, and other public utilities as well, are facing in this era of generally rising prices and operating costs. For various reasons there has developed in this nation of ours some hostile public opinion against public utilities. Electric company surveys invariably show that a majority of customers think their rates are "too high" when the question is put to them in abstract form. Yet, a greater majority of the same group interviewed does not even know what the rates actually being charged amount to.

The same fellow, who had seen the price of nearly everything else he buys

or wears, or uses, go up 50 to 100 per cent since before the war, often squawks the loudest when the utility company asks for less than a penny a day raise.

Very often these proposed telephone company rate increases—as in the situation outlined above—do not amount to more per month than twice the price of a package of cigarettes or the price of a magazine or ice cream soda, which the customer would buy most casually without giving the trifling investment a second thought. (As in the case of our hypothetical Joe; he will often smoke up a whole month's rate increase in the form of a cigar during the time he takes to argue about it.)

Somehow the idea has gotten launched in the public's mind that telephone companies and other public utilities are, or should be, immune from the laws of economic supply and demand which govern the prices of other commodities. They think that somehow the telephone company should go on serving them at the same rate for the next 25 years—for no better reason than the fact that they have kept the same rates for the *last* 25 years.

Sometimes the very same people who sympathized with and encouraged the paying of higher wages in the telephone industry during the strike trouble last spring are crying the loudest in protest against rate increases. They think the company's payroll should go up but that its revenue should stay down. Any inconsistency does not occur to them.

Just why is this? The answer is both simple and plain. The public has been exposed to anti-utility and anti-business propaganda for years. The utility companies, including the telephone company, have not been able to counteract this hostility. There are entirely too many screwballs like Joe running around loose in this country and not enough well-informed people to blow the whistle on him.

The general average of American citizenry has a sense of fair play. But it also is uninformed on industrial economics. It is an easy prey to those who, for one reason or another, want the American public to be hostile towards business.

And what is the matter with Joe? What makes *him* act that way? Does Joe sincerely believe that all employers are wicked and that all public utilities are controlled by selfish monopolists? The chances are that Joe really does know better even if he will not admit it to himself. Joe has his own ideals or at least a substitute for ideals. Joe vizualizes a planned society of state control. He realizes that the present successful American system of free private enterprise stands like an insurmountable barrier against this nation adopting such an attitude.

Joe knows that constant repetition of catch phrases, the constant singing of a song of hate against business and bosses, etc., has a cumulative effect. He knows that the free enterprise system can only succeed as long as business itself is successful. Therefore, anything to discredit or undermine American business—and such an important segment of the American business as the telephone industry or other important public utility industries—are just so many steps along the road towards his objective. Joe may be a very sincere fellow about this, according to his own lights.

Opposition to utility rate increases, the constant harping repetition about "monopolistic control" and other techniques along the same line are simply means to a proper end and, therefore, justified in themselves. That is the way Joe looks at it.

Probably nothing can be done about Joe (unless a war breaks out with his favorite foreign country and we have to give him a little rough treatment). But the actual number of Joes in the United States is quite small, and a problem that could easily be handled if a much more important problem was settled first.

The much more important problem is simply ignorance, or more politely, a lack of information. The public fears what it does not understand. After it understands, it very often finds itself in agreement with the very thing it feared.

• • •

A good example of this was seen in the recent exhaustive poll of opinion on the Taft-Hartley Act conducted by *Look* magazine (issue of Sept. 26). This poll showed that a great majority—running somewhere between 60 to 80 per cent on various forms of the same general questions—declared themselves as being opposed to the Taft-Hartley Act. Some wanted it softened, some wanted it repealed, but only a small minority of these workers were satisfied with it.

The most revealing part of this poll is the fact that, when *Look* magazine broke the Taft-Hartley Act down into its 10 major provisions, and asked these same workers if they favored such things as "barring Communists from union membership," or "letting the boss talk to the employes as long as he does not threaten them," or "making it necessary for a man to belong to the union to keep his job"—*then almost the same overwhelming majority were in favor of all 10 constituent provisions of the Taft-Hartley Act.*

This means, as *Look* magazine rightly concludes, that the same people who say they are against the Taft-Hartley Act have never read it and are not even remotely familiar with its provisions. They do not know what is in the act and when that is explained to them they find they are in favor of it.

In other words, some union bosses, who are the real opponents of the Taft-Hartley Act, have done a *successful* job of putting over their propaganda with the workers. They knew that the workers were uninformed. So they capitalized on that lack of information. They kept dinning into the ears of the workers that it was "a slave labor act." Without any other sources

BE PREPARED FOR FIRE!

(1) KNOW WHERE THE NEAREST FIRE BOX IS

Many homes and stores were destroyed by fire because nobody knew where to turn in the alarm.

(2) LEARN HOW TO OPERATE FIRE EXTINGUISHERS

Prompt use of fire extinguishers and other emergency equipment puts out 60 per cent of all fires, Fire Protection experts say.

(3) CONDUCT FREQUENT FIRE DRILLS

Home owners are finding it's good insurance to teach members of the family what to do when a fire breaks out. In schools, offices and industrial plants this is a "must."

(4) RECOGNIZE AND REMOVE FIRE HAZARDS

Some of the most dangerous fire hazards are the most easily removed. Be on the lookout for oily rags, rubbish accumulations, frayed wires, improper fuses, faulty furnace pipes and discarded matches.

(5) BE ON THE ALERT FOR FIRE

Fire strikes when you least expect it. All blazes are small at the start. More can be done in the first five minutes to fight fire than in the next five hours.

of information or explanation, a good many workers accepted this crude and unfair generalization as true. Nobody wants to be a slave, and, on general principal, no one is going to be in favor of legislation which tends to enslave the workers. It is the old story of giving the dog a bad name. The workers feared what they did not understand.

Well, a good deal of that exists in the utility field. It is a challenge to the industry to make these facts plain —to make them emerge clearly. Attractive presentation and repetition of the simple economic facts of life, in utility operations, would dissipate the hostile attitude in the public mind so quickly and so completely that our friend Joe would soon find that he was talking to himself. So far, many telephone companies have done a good job through paid advertisements and other publicity media to demonstrate the need for increased rates. But the complete job has not been done, or nearly done. It is going to take a lot more money and a lot more repetition before a good many people will ever think that a public utility has as much right to make a living as anybody else.

The moral of this story is just this: If you are a telephone executive or if you have a more modest position in the industry, think twice before refusing, or cutting or criticizing necessarily expensive efforts to sell the industry's case to the public. Today it is a matter of your company's dollars and cents. Tomorrow it may be a matter of life or death. Cooperative efforts along this line have a cumulative effect. What the gas company or the electric company, or the transit company does in the community helps to break down the prejudice against the telephone company and vice versa. What the telephone company does in one city, or one state, or one area has the effect of improving public sentiment in another state, another city, or a nearby area where another company may serve.

And if the bills for the advertisements and the research seem to come pretty steep, don't grumble about how much better you could use the extra money in your own pay envelope. Just think about Joe passing the hat and setting up the gang to eats and drinks. If he can afford it, so can you. Any telephone company that sells its rate case to a state commission but neglects to sell it to its own customers is heading for some hard times.

BOBBY SOX. **By Marty Links.**

(Released by Consolidated News Features) (Trade Mark Reg. U. S. Pat. Office)

"Dad, will you turn the radio up full blast? Beverly wants to hear Dick Haymes!"

Wrong Number

The proverbial professor—one of the absent minded type—was recently awakened by the telephone at 2 a.m. The caller inquired, "Is this one, one, one, one?"

"No," answered the professor. "It is eleven eleven."

"Oh, pardon me," said the caller. "Wrong number. Sorry I disturbed you."

True Measure of a Man

A man has come to himself only when he has found the best that is in him, and has satisfied his heart with the highest achievement he is fit for. It is only then that he knows of what he is capable and what his heart demands. And, assuredly, no thoughtful man ever came to the end of his life, and had time and a little space of calm from which to look back upon it, who did not know and acknowledge that it was what he had done unselfishly and for others, and nothing else, that satisfied him in the retrospect, and made him feel that he had played the man. That alone seems to him the real measure of himself, the real standard of manhood.—**Woodrow Wilson.**

THE PLANT MAN'S NOTE BOOK

BY
RAY BLAIN
TECHNICAL
EDITOR

THE moving finger of a man dialing a telephone pointed the way toward a numbers and race bet headquarters, Washington, D. C., police reported recently. The ringleader of this racket was arrested in a drug store where he was using the public telephone. Police said they had been shadowing him for several weeks. Watching his fingers as he dialed a number in the booth, police jotted down the number and traced it to an apartment where the bet headquarters was located.

• • •

A new all-metal step ladder, strong enough to do any man-sized job, yet light enough for a woman to handle, recently has been placed on the market. This new ladder features great structural strength and durability made possible by all-steel, tubular construction, and a wide-angle "legless" base, that it is claimed won't slip, tip or wobble on any surface or sink into soft ground.

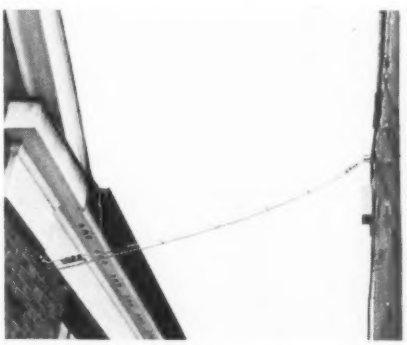
Other features are extra wide steps, each tested to support 1,000 pounds, with deeply embossed "traction tips"; self-locking brace that holds the ladder securely open or closed; collapsible worktray, conveniently located at top of frame with flanges on all sides.

This ladder folds to a maximum of only 5½ ins. and is built in four sizes, —four, five, six and seven steps.

This safe and convenient-to-use ladder should prove extremely popular in the telephone field.

• • •

There is a trend toward the use of lead covered cable to replace drop wire when five or more lines are located in one building. While this type of plant has a higher initial cost, the saving



in later maintenance often proves desirable in this type of plant.

A new installation of this type is shown in the accompanying photograph.

• • •

A total of 4,740 children under 15 years of age was killed in automobile accidents in America in 1946. This should indicate the necessity for more care in driving.

• • •

During the recent rate hearing of the Southeastern Telephone Co. at Tallahassee, Fla., Manager P. M. Schuchart presented numerous charts as part of his testimony. After he had finished, someone asked, "How does he spell his name?" "Shu-cart," was the reply. "Well, it could easily be Show-Chart," came the answer.

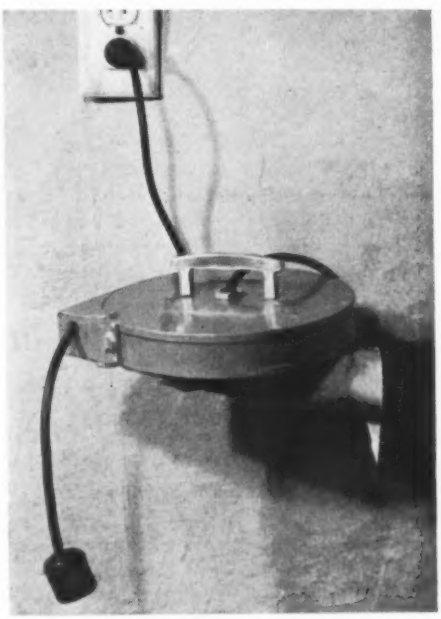
It was also pointed out that people had difficulty getting calls through in Tallahassee between 5:00 and 6:00 p.m. on account of the early evening activities of the local "bobby sox" brigade.

Checks of service during this hour in a survey of peak periods of use reveal that many of the city's younger set are "on the phone" conversing, playing favorite records, exchanging ideas about homework, or planning parties and dances.

Manager Schuchart termed the telephone "the sine quo non of the bobby-soxers' quasi-social activities."

• • •

The extension cords used on electrical appliances and portable tools have long been considered a dangerous nuisance. A newly designed extension cord reel appears to fill a need of long standing in this connection.



Several types of reels are available and are equipped with cords from eight to 60 ft. in length to meet the requirements of various tools. This reel eliminates kinked, snarled or twisted cords. It also minimizes wear on cords and thereby reduces fire and accident hazards to a minimum.

When not actually in use, excess cord is retracted and out of the way.

• • •

Recently we were privileged to inspect some new aluminum window frames installed in a residence under construction. These windows embody all of the usual features found in

present-day windows and, in addition, are furnished with a concealed subframe. Screens and storm sash are provided. Thermopane type of double glazing, as well as standard single glass, can be furnished, as desired. These windows move freely and will never stick. Neither will they ever require painting.

• • •

We continue to hear an increasing number of complaints regarding party line telephone service and how it fails to meet our modern needs. If we do not have the often threatened depression, it is reasonable to predict that a change-over from party to main lines will result in good telephone business for years to come. Subscribers in large numbers in most localities will be pleased to pay the higher rate for individual line service just as soon as adequate facilities will make this better service possible.

PLANT MAN'S QUIZ

Q. Is it possible to make a duct splice in 400 pair, 22-gauge, lead covered cable? If so, what should be its maximum diameter and length?

A. Duct splices are entirely possible and are occasionally used in cable of this size. Due, however, to their excessive cost, they should be avoided whenever possible. A splice in a 404-pair, 22-gauge, cable should not be over 2½ ins. in diameter and should be about 33 ins. in length.

• • •

Q. When we purchase lead covered cable, is it necessary also to buy the reel it is delivered on?

A. Arrangements always can be made to return reels and lagging to the supplier and obtain a refund. Manufacturers usually are anxious to secure reels which have been preserved in good condition.

• • •

Q. For the past two years we have experienced considerable station trouble resulting from lightning. Recently, we have had the following two peculiar cases which we would be pleased to have you explain to us:

Case "A." Telephone connected to the cable terminal by No. 14 drop wire. The station protector grounded to a 6-foot rod sunk full length. Rainy season of the year. The telephone was struck by lightning and severely damaged though neither the fuse nor the protector blocks were damaged in the least.

Case "B." This case was similar to the above except that it occurred on an open wire line during its construction. The telephone was installed and the protector connected to a 6-foot rod, but the drop wire was not connected to the line. The telephone was damaged as in case "B," but the fuses and protector blocks were again unharmed.

A. An evaluation of the information furnished indicates that your trouble is probably due to a high resistance ground connection in each case. A check of the soil conditions in your locality reveals sand with a layer of rock at varying depths which proves an effective insulator. We are informed that under soil conditions of this nature it is often necessary to drive a 2-inch pipe to a depth of 60 feet in order to obtain a 10 ohm ground. We therefore suggest that you measure the resistance of the ground rods in question.

It is also recommended that you consider the use of water pipe grounds, if available, in this locality.

We have information on a locality similar to that in which you operate wherein lightning caused considerable difficulty until all telephones had been grounded to the water pipes. As an extra precaution the water system was bonded to street car and railroad tracks.

• • •

Q. We are planning the installation of a small switchboard with a wall type main frame. Will an overhead cable run prove better than cables placed under the floor from the main frame to the switchboard? Is it necessary to place the battery and generator leads in iron conduit?

A. An overhead cable rack makes a satisfactory installation in a case of this nature. If cables are placed under the floor, the lead covered variety should be used to provide ample moisture protection.

The battery and generator leads should be placed in either metallic conduit or lead covered cable.

• • •

Q. When five-party selective ringing is used on a rural line, what ringing frequencies are employed?

A. One system commonly used employs frequencies of 20, 30, 42, 54 and 66 cycles.

Q. Does a repeating coil serve any useful purpose in a magneto switchboard cord circuit?

A. Under certain conditions, a repeating coil in a magneto cord circuit tends to reduce noise on a connection. The repeating coil serves to overcome a greater part of the disturbances and foreign noises which ordinarily interfere with conversation when dissimilar lines, such as metallic and grounded or balanced and unbalanced lines, are connected together.

• • •

Q. The voltmeter on our wire chief's test cabinet has been damaged and does not register correctly. Can you describe a method whereby we can recalibrate it?

A. Meter repair is a trade very similar to watch making. We suggest, therefore, that you return your meter to its manufacturer for the necessary repairs.

• • •

Q. Why is the use of insulators in guy wires considered necessary on jointly used pole leads?

A. According to the National Bureau of Standards Handbook H39, the chief reasons for placing strain insulators in guys may be briefly outlined as follows:

(1) To protect pedestrians from guys which may be in accidental contact with supply wires.

(2) To protect linemen working on poles from guys which may be in accidental contact with supply wires.

(3) To minimize the possibility of plant damage which might result in unsafe conditions.

• • •

Q. What is "gully" type cable and how is it used?

A. This is a light wire armored, lead covered, cable designed for use in crossing gullies, small bodies of water or swamps. This cable has greater mechanical strength than ordinary steel tape armored cable, but is considerably lighter and less expensive than standard wire armored submarine cable.

• • •

Q. When a cable is extended inside a building for termination, is it considered good practice to install an outdoor type terminal to avoid splicing paper to textile insulated cable for the installation of a house type terminal?

A. Outside type terminals are often installed inside buildings, in basements and other damp locations. A cheaper and usually a better job is provided by the installation of a sealed chamber terminal. This type terminal is connected by splicing direct to the paper insulated cable.

THE OPERATOR'S CORNER

BY
MAYME WORKMAN
TRAFFIC
EDITOR

LUNCH counter service usually is popular with business people because, as a rule, the service is prompt, the food is hot when served and, generally speaking, tipping is not customary. The latter is an important item to people who eat out regularly, particularly at this time when the price of food is extremely high.

Dropping in for lunch at her accustomed habitat, the writer was disappointed to find all the counter seats filled. A booth nearby was vacant and, in preference to waiting for a place at the counter, she decided to have table service for a change. However, she soon realized this was a mistake when she saw the waitress with the "expressionless face" approaching her table. Not a word was spoken until the writer gave her order, clearly and distinctly—"an American cheese sandwich on rye, with mustard on the side, fresh peach sundae, no whipped cream, please, and black coffee." After waiting a considerable length of time, the waitress returned with the order, and what do you think it was? Certainly not what had been ordered. The cheese sandwich was toasted — on "white" bread—the sundae was topped with whipped cream, and the coffee was anything but black as it had been topped generously with cream.

Errors are vexatious to customers at any time and under all circumstances but perhaps the most annoying of all errors are those involving food or telephone service.

As the writer surveyed her food, she thought, "I gave my order clearly and distinctly, yes, and pleasantly, too, and yet it was not filled correctly or to my liking." The only possible conclusion was, "inattention and lack of interest on the part of the waitress." No doubt many telephone customers reach the same conclusion after receiving a wrong number.

If the waitress had displayed a friendly and interested attitude, the customer would have been less disturbed and annoyed, thinking, "Well, she probably did the best she could." A pleasing manner, like charity, covers a multitude of sins. Poor service, heaped upon indifference and churlishness, is intolerable.

It takes so little effort to be friendly and attentive and it means so much to a customer.

It is only natural that we compare the service we receive with the service we have been taught to render. On a recent Sunday morning, the writer stopped in an air-cooled drug store and ordered a drink at the fountain. After waiting for about 10 minutes while the girl who had taken her order expressed her views about the firm and boasted about how she could get a job paying her more money elsewhere, she approached the writer, saying, "What did you order?" I am sure I displayed my feelings when I stated, "Not a thing that you can serve."

How often we hear an operator say, "What number did you call?" when she should say, "Will you give me the number again, please?" or "May I have your call again, please?" indicating that she knows she is asking for information previously received. And how many operators, after obtaining the called number and making suitable acknowledgment, make a memorandum of the number to avoid further requests?

From Nine to Five *By Jo Fischer*

"But I had to cut you off, Mr. Wump. I'm expecting a call from my boy friend and all the other lines are busy"

The use of a prescribed phrase may seem unimportant at times but you may be sure that all prescribed phrases serve a definite purpose and their correct use may mean the difference between a satisfied, pleased customer, and one who is displeased and irritated.

In teaching a new girl, it is important that we convey the purpose of prescribed phrases. There is more to phraseology than just learning the phrase letter perfect. We also should know why a particular phrase is used and what purpose it serves.

Questions from Operators

(1) If the calling party is not certain he is calling the right number on a local call, what should the operator say to him?

(2) What is the first thing an operator should say to the calling party when he says he has received a wrong number? This is on a local call.

(3) Is it necessary to keep a record of emergency calls?

(4) Is it permissible to say, "Will you look in your directory for the number, please?" if the number they are calling is in the directory?

(5) If a calling party asks for the time of day, and it is not the practice in your office to give out this information, what phrase should you use?

Answers to these traffic questions appear on page 32.

V V

Nebraska Company Incorporates

Ernest Reker, Ewald Bauer and Ralph Lefler have incorporated the Col-Nebraska Telephone Co. in Nebraska, as a non-profit corporation, and will receive service from the Sidney exchange of the Northwestern Bell Telephone Co.

V V

New Lincoln T&T Manager

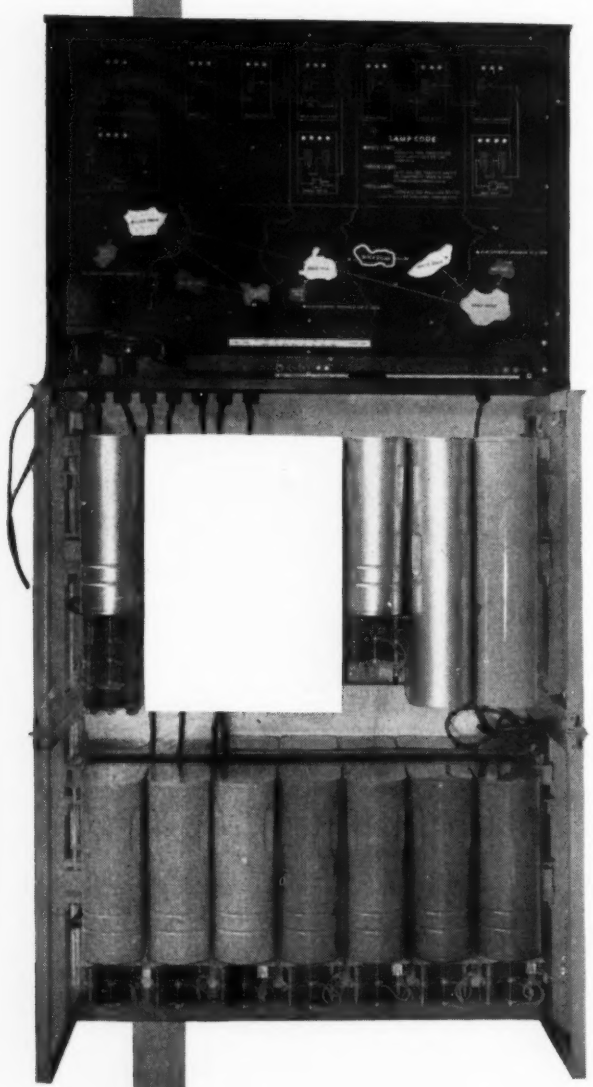
Appointment of T. C. Cone as area manager of the Lincoln (Neb.) Telephone & Telegraph Co. at Seward, effective Sept. 15, has been announced by Merle M. Hale, general commercial superintendent. Mr. Cone succeeds Chris Haberman who is retiring to take up residence in California.

see the *Newest* equipment in Au

at the **AUTOMATIC ELEC**

SUITE 50

OCTOBER 6



STROWGER
AUTOMATIC DIRECTOR

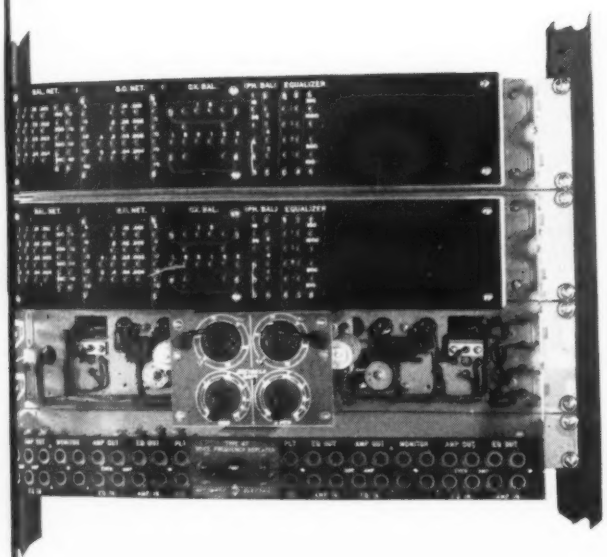
Strowger Automatic equipment including the "Director" will be shown in an actual demonstration of its register-translator-sender facilities for extended area automatic toll dialing over a 10-exchange tandem network. The exhibit is arranged so that you can follow the operation of this "Magic Brain," from the moment of dialing until the call is completed at a distant exchange.

l Operation

EIC EXHIBIT

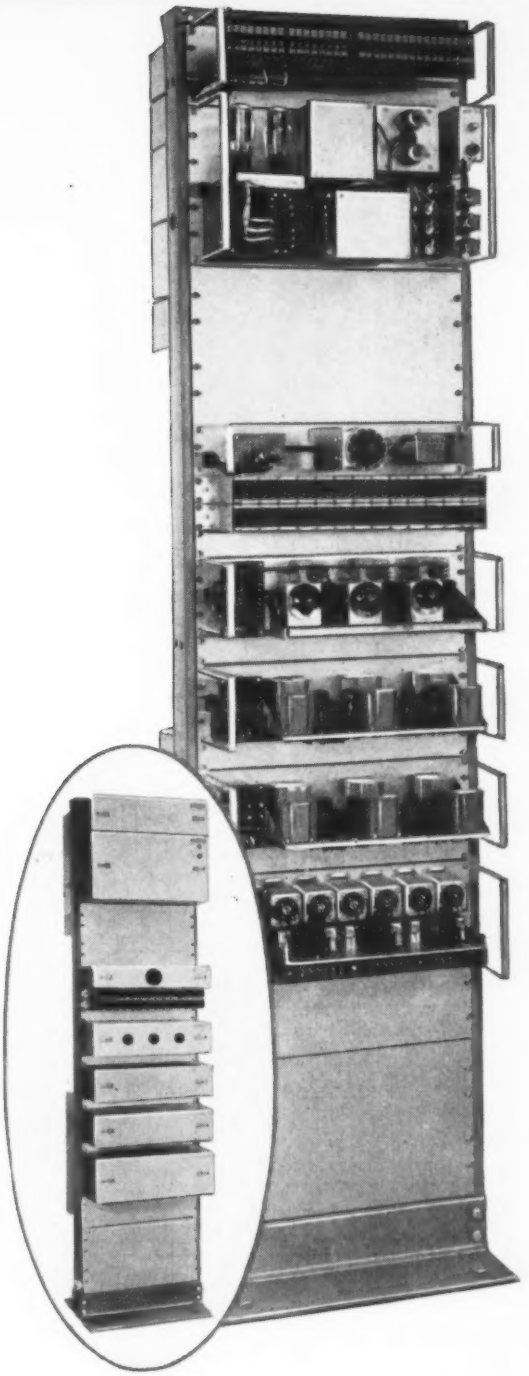
5 STEVENS HOTEL, CHICAGO

BER 6 • 1947



VOICE-FREQUENCY REPEATER

Entirely *new*, the Automatic Electric Voice-equency Repeater is unit-constructed for econ-y and complete flexibility — adaptable to en wire or cable (loaded or non-loaded); o-wire or four-wire lines; metallic, simplex or mposite circuits; DC or AC signaling, and for ermediate or terminal stations. It provides economical solution to transmission problems. sure to see it!



LENKURT CARRIER

Four separate systems will be demonstrated. The largest provides three additional telephone channels, which may be used, if desired, for modern facsimile transmission or for voice-frequency telegraph (optionally, up to nine voice-frequency telegraph channels may be provided without sacrificing any of the telephone channels). The simplest system provides one carrier telephone channel, at such low cost that it is practical even for use on rural lines!

OMATIC ELECTRIC

Developers of the Strowger Step-by-Step "Director" for Register-ator Operation . . . Machine Switching Automatic Dial Systems , Signaling and Communication Apparatus . . Electrical Engineers, Designers and Consultants

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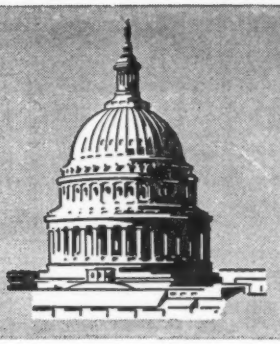
tors: INTERNATIONAL AUTOMATIC ELECTRIC CORPORATION

COURTS and COMMISSIONS



Southwestern Bell's Oklahoma Rate Hearings Delayed

Because of a crowded docket the Oklahoma Corporation Commission will be unable to begin hearings on the application of the Southwestern Bell Telephone Co. for increased rates in Oklahoma before Jan. 20 of next year. Three days have been set aside for the hearings at that time. A second series of hearings has been set for Feb. 25, 26 and 27.

Chairman Reford Bond of the commission stated that Oklahoma cannot join with other states in hearings because of differences in laws and commission procedures, but will cooperate in exchanging information which may be jointly useful.

The recent Oklahoma Legislature did not make an appropriation for a statewide appraisal by the telephone department of telephone properties, including Southwestern Bell exchanges, so that the Oklahoma commission will be forced to begin its hearings with a limited amount of field appraisals.

In its Oklahoma application, the Southwestern Bell Telephone Co. claims that it is failing by $2,900,000 per year to realize even a fair minimum return on its "fair value" in Oklahoma, placed at $70,000,000 for its 143 exchanges. The application is based entirely upon requested increases on intrastate telephone exchange rates and does not involve toll rates.

The company states that local telephone rates in the vast majority of cases have not been changed in Oklahoma in 20 years despite rapid increase in operating costs within that period. The company is not filing requested earning figures for various exchanges but expects to develop its needs for specific increases as the hearings proceed.

According to company figures, however, company revenues, by reason of increased business, have increased 93 per cent since 1940 while general costs for that period have risen 123 per cent.

In a statement issued in connection with the application, Manley L. Pearcy, general manager, Southwestern Bell Telephone Co., in Oklahoma, said that company payroll in the state, which accounts for more than half of all costs, has jumped 220 per cent since 1940 due to wage increases and a larger force, and building costs have risen 100 per cent during that period. He cited a 35-ft. pine pole that cost $6.30 in 1940 and now costs $14.99, an increase of 135 per cent, as a single example of the way prices of materials have skyrocketed in this seven-year period.

V V

Sunnyside, Ore., Company Receives Rate Increase

Rates, rules and regulations filed with the Oregon Public Utilities Commissioner on May 26 by the Sunnyside (Ore.) Telephone Co. became effective Oct. 1. The approved rates, when applied with dial operations, will result in an estimated annual revenue increase of $2,460 for the company.

In his ruling, the commissioner pointed out

(1) that the Sunnyside company is now installing dial operations in its entire exchange area which will result in standard 24 hour service to all subscribers,

(2) that in seven months' operation, from Jan. 1, 1947 through July 1947, the company showed an operating loss of $459.92 and that additional loss will be experienced upon the institution of dial operations as all tolls will be handled through an arrangement with the Pacific Telephone & Telegraph Co. in Portland,

(3) that at the present time no salary is paid the manager for administration and management of the system,

(4) and that the granted rates are not out of line with those of similar size exchanges operating in Oregon.

V V

Nebraska Commission Studies Southeastern's Rate Request

The Nebraska State Railway Commission has taken under advisement, following a hearing in which little opposition was manifested, the application of the Southeastern Telephone Co. of Falls City for an increase of rates applicable to the type of service now being given and for a schedule of charges, to become effective when the proposed change to dial service is completed. (TELEPHONY, July 26, p. 32.)

Mrs. Pauline Nixon, chief operator and assistant to E. H. Towle, chief owner and manager, testified that the company was being operated at a loss since Apr. 1, when an increased schedule of wages of more than $8,000, was negotiated with the union, and that for the year a deficit of $23,536 would be incurred. Adoption of the Schedule A increase would add annual revenues, she said, of $31,360 on the basis of present stations. After federal taxes, this would leave the company a net return of $6,125, or 2.3 per cent on the present value of $299,159.

Mrs. Nixon said that conversion of the entire system to dial equipment would take an outlay of new cash in the amount of $329,000, and that after completion the plant would have a value slightly in excess of $470,000. Under the proposed automatic rates contained in Schedule B, gross revenues would increase by approximately $50,000, leaving an estimated net of $26,414, or a return of 4 per cent.

The company serves more than 2,800 subscribers at Falls City, Rulo, Shubert, Stella, Salem, Barada, and Verdon, all in Richardson County.

V V

Three Minnesota Independents Increase Rates

Rate increases for three Independents, the Rural Telephone Co., Osseo; the Kittson Telephone Co., Hallock, and the Central Telephone Co., Sioux Falls, S. D., for its Minnesota exchanges, were approved Sept. 24 by the Minnesota Railroad & Warehouse Commission.

The new rates for the Rural company's Osseo and St. Michael exchanges, effective following establishment of common battery service at Osseo, are as follows:

Class of Service	*Present Gross Rates*	*Proposed Gross Rates*
Individual line, business	$3.50	$4.25
Two-party line, business	3.00	3.75
Private branch exchange trunks	5.25	6.25
Individual line, residence	2.00	2.75
Two-party line, residence	..	2.25

Four-party line, residence	1.75	..
Rural station owned, metallic, magneto	2.00	2.25
Rural station owned, metallic, common battery, with wall handsets	..	2.50
Rural station owned, business, magneto	2.50	2.75
Rural station owned, business, common battery with wall handsets	..	3.00

In addition to the above rates, 25 cents per month additional for handsets on magneto rural lines; temporary disconnections at one-half regular rate for any class of service. All rates to be billed monthly in advance, with a discount of 25 cents per month to be allowed on all gross rates if paid on or before the 20th day of the month in which service is rendered.

Supporting its claim for higher rates, the company presented the following figures: Under old rates, operating revenues: $29,839; operating expenses, $22,722, for a net income of $7,117. Under new rates, operating revenues, $33,871; expenses, $27,130, for a net income of $6,741 or 6 per cent of book cost, valued at $6,741.

The following new rates will become effective for the Kittson company (TELEPHONY, Aug. 16, p. 26) on certification that employes' hourly wage rates have been increased as proposed in its application:

Class of Service	*Present Gross Rates*	*Proposed Gross Rates*
Individual line, business	$2.75 (a)	$3.75 (a)
Two-party line, business	2.25 (a)	3.25 (a)
Rural multi-party, business (grounded)	1.75 (b)	2.75 (b)
Rural multi-party, business (metallic)	..	3.25 (b)
Individual line, residence	1.75 (a)	2.50 (a)
Two-party line, residence	1.50 (a)	2.25 (a)
Four-party line, residence	..	2.00 (a)
Rural multi-party, residence (grounded)	1.50 (b)	2.25 (b)
Rural multi-party, residence (metallic)	..	2.75 (b)
Extension stations, business	1.00 Net	1.00 Net
Extension stations, residence	.50 Net	.75 Net

(a) All local rates to be billed monthly in advance with a discount of 25 cents to be allowed on all gross rates if paid on or before the 15th day of the month in which service is rendered.

(b) All rural gross rates to be billed quarterly in advance with a discount of 75 cents to be allowed if paid on or before the 15th day of the first month of the quarter in which service is rendered, 50 cents to be allowed if paid on or before the 15th day of the second month of the quarter in which service is rendered, and 25 cents to be allowed if paid on or before the 15th day of the third month of the quarter in which service is rendered.

The financial statement submitted by the Kittson company was as follows: Under present rates: Operating revenues, $16,735; expenses, $15,933, for a net income of $802. Under proposed rates: Operating revenues, $22,159; expenses, $20,138, for a net income of $2,021 or a ratio of 3.6 per cent of the original cost depreciated, which is $55,984.

The Central Telephone Co. was permitted to place in effect Oct. 31 rates applied for (TELEPHONY, Aug. 30, p. 29) with the exception of the four-party residence rate at Balaton, Edgerton, Lake Wilson, Triumph and Welcome, which will be $1.75 per month net, and service switching at all exchanges, which will be 60 cents net per station. New rates are for Balaton, Canby, Dawson, Edgerton, Farmington, Lakefield, Lake Wilson, Lewisville, Madison, Sherburn, Slayton, Triumph, Truman and Welcome.

Following is the company's comparative statement covering operations for a 12-month period, Column II giving effect to present rates and payroll adjustments effective June 1, on the basis of actual operations for the first five months of 1947, Column III using same factors on basis of proposed rates. Column IV is commission's adjustment of Column III, giving effect to rate adjustments:

I	*II*	*III*	*IV*
Operating Revenues	$230,972	$284,535	$282,346
Total Operating Expenses and Taxes	225,249	245,045	244,087
Net Income	5,723	39,490	38,259
Rate Base Value	632,868	632,868	632,868
Ratio Net Income to Above	.90 per cent	6.24 per cent	6 per cent

Upon conversion to dial operation the following increases (approved Sept. 29) will become effective for the Ellsworth and Lakeville exchanges of the Central Telephone Co.:

Ellsworth—

Class of Service	*Present Gross Rates*	*Proposed Gross Rates for Dial Service*
Individual line, business	$2.50	$4.25
Two-party line, business	...	3.50
Individual line, residence	1.75	2.75
Two-party line, residence	1.50	2.25
Rural business multi-party (metallic)	2.00	3.00
Rural residence multi-party (metallic)	2.00	2.50
Extension business	.75 net	1.00 net
Extension residence	.50 net	.75 net

Lakeville—

Class of Service	*Present Gross Rates*	*Proposed Gross Rates for Dial Service*
Individual line, business	$3.00	$3.75
Two-party line, business	2.50	3.00
Individual line, residence	2.00	2.75
Two-party line, residence	1.75	2.25
Rural business multi-party (metallic)	1.75	2.75
Rural residence multi-party (metallic)	1.75	2.25
Extension business	1.00 net	.75 net
Extension residence	.50 net	.50 net

V V

Six Minnesota Independents Seek Rate Changes

Six Minnesota Independents have applied to the Minnesota Railroad & Warehouse Commission for authority to increase their rates. The names of the companies, the present and proposed rates, and the scheduled hearing dates are:

The Dunnell (Minn.) Telephone Co., Oct. 21: Individual line, business, from $1.75 to $3.25; two-party line, business, $2.75; individual line, residence, from $1.75 to $2.25; four-party line, residence, $2.00; rural stations owned, metallic, from $1.75 to $2.25; extension stations, business, from 75 cents to $1.00 net; extension stations, residence, from 75 cents to $1.00 net.

The Sleepy Eye (Minn.) Telephone Co., Oct. 21: Individual line, business, from $3.00 to $4.00; two-party line, business, from $2.50 to $3.50; individual line, residence, from $1.75 to $2.25; two-party line, residence, from $1.50 to $2.00; four-party line, residence, $1.75; rural multi-party, residence-metallic, from $1.75 to $2.25.

The Anoka County Cooperative Telephone Association, Constance, Oct. 24, at the Constance and Bethel exchanges: Individual line, business, from $2.25 to $3.00; two-party line, business, $2.00; multi-party line, business $2.25; individual line, residence, from $1.75 to $2.25; four-party line, residence, $1.50; multi-party line, residence, $2.00; rural stations owned, metallic, from $1.50 to $2.25; rural stations owned, grounded from $1.50 to $2.00.

The Lake Park (Minn.) Telephone Co., Oct. 27: Individual line, business, from $1.75 to $2.25; two-party line,

business, from $1.50 to $2.00; four-party line business, $2.00; individual line, residence, from $1.50 to $2.00; two-party line residence, from $1.25 to $1.75; four-party line, residence, $1.75; extension stations, business, from 75 cents to $1.25 net; extension stations, residence, from 50 cents to $1.25; rural multi-party, company owned, from $1.25 to $1.75.

The Motley (Minn.) Telephone Exchange, Oct. 27: Individual line, business, from $2.50 to $3.75; two-party line, business $3.25; individual line, residence, from $1.50 to $2.50; four-party line, residence, $2.00; extension stations, business, from $1.00 to $1.00 net; extension stations, residence, 75 cents net; service switching stations, from 35 cents to 75 cents net.

The Heinola Telephone Co., New York Mills, Oct. 27, at its New York Mills and Bluffton exchanges: *Individual line, business-comm. battery from $2.75 to $3.25; individual line, business-magneto from $2.50 to $3.00; *individual line, residence-comm. battery from $2.00 to $2.50; individual line, residence-magneto from $1.75 to $2.25; two-party line, residence-magneto, $1.50; multi-party line, residence-magneto $2.00; rural stations owned, metallic from $1.25 to $2.25; rural stations owned, grounded from $1.25 to $1.75; rural stations owned, business $2.75; service switching stations from 35 cents to 60 cents.

*—Optional.

V V

Indiana Commission Grants Two Rate Petitions

The Indiana Public Service Commission has approved the following new monthly rates for the Farmers Mutual Telephone Co., Millersburg, and the Peoples Mutual Telephone Co., Wolcottville: *Farmers Mutual company*: One-party, business, from $1.40 to $2.00; party line, business, from $1.25 to $1.85; one-party, residence, from $1.25 to $1.85; party-line residence, from $1.15 to $1.75; rural residence, from $1.15 to $1.75, and one-party, rural residence, from $1.40 to $2.00. *Peoples Mutual company:* One-party, business, $3.50; two-party, business, $3.00; one-party, residence, $2.50; party line residence, $1.95.

The commission dismissed the petition of the Central Indiana Telephone Co. of Sheridan for an emergency increase after petitioner failed by exhibits and oral testimony to prove that such an emergency existed.

Rate increase petitions also have been filed by the Argos (Ind.) Telephone Co.; the Greetingsville Telephone Co.; Citizens Telephone Co., Fowlerton; Citizens Telephone Co., Fairmount, and Midwest Telephone & Utilities Co., Petersburg. Petitions for service investigation include those of the Klondike (Ind.) Telephone Co., Craigville (Ind.) Telephone Co. and the Indiana Midland Telephone Corp., Roachdale.

V V

Minnesota Company's New Rates To be Effective Oct. 1

Rate increases for the Red Lake Falls exchange of the Garden Valley Telephone Co., Erskine, were granted Oct. 1 by the Minnesota Railroad & Warehouse Commission. The new rates, which will become effective Oct. 31, are:

Class of Service	*Present Gross Rates*	*Gross Rates Granted*
Individual line, business	$2.75	$3.25
Two-party line, business	2.50	3.00
PBX trunks	2.75	3.25
Individual line, residence	1.75	2.25
Two-party line, residence	1.50	2.00
Four-party line, residence	...	1.75
Rural multi-party, residence—metallic	1.75	2.25
Rural multi-party, residence—grounded	1.50	1.50
Service station switching	.35 net	.60 net

As the company serves 144 rural stations on grounded lines, susceptible to inductive interference on which a high noise level is imposed by paralleling power lines, the commission denied the company's proposed rate of $1.75 for that service.

The company's request for increases of 50 and 75 cents per month for business and residence service, respectively, was also refused as the commission was of the opinion that the residence service should not be increased more than 50 cents a month. The regulatory body admitted that its decision would reduce the company's estimated net income approximately $700 a year but stated that this amount would be recovered when the grounded rural lines were metallicized and receiving the metallic rates.

V V

Rates Up in Banfield, Mich.

The following revised rates for normal and foreign exchange service of the Citizens Telephone Co. of Banfield were approved Sept. 19 by the Michigan Public Service Commission: Multi-party service, business and residence, quarterly rates, $4.00; foreign exchange, rural multi-party service, business or residence, net monthly mileage charges: (a) First one-half mile or fraction, $1.00; (b) second one-half mile or fraction, $1.25; (c) third one-half mile or fraction, $1.50; (d) fourth one-half mile or fraction, $1.75.

Minnesota Rate Pleas Set for Oct. 20

Hearings on proposed rate increases by the New Ulm (Minn.) Rural Telephone Co. and the Tri-County Cooperative Telephone Co., Hamburg, are scheduled for Oct. 20 before the Minnesota Railroad & Warehouse Commission. Present and proposed rates follow:

New Ulm Rural Telephone Co.

	Present Rates	Proposed Rates
Individual Line Business	$3.00	$4.00
Two-party Line Business	2.50	3.50
Individual Line Residence	1.75	2.50
Two-party Line Residence	1.50	2.25
Rural Stations Owned, Metallic	1.75	2.00
Rural Stations Owned, Business	1.75	2.00

Four-party line, residence charge of $1.75 has been asked.

Tri-County Cooperative Telephone Co.

	Present Gross Rates	Proposed Gross Rates
All classes of service	$1.75	
Individual line, business		$3.00
Two-party line, business		2.50
Individual line, residence		2.25
Four-party line, residence		2.00
Rural stations owned, metallic		2.25

V V

Georgia Company Gets Increase Upon Conversion to Dial

The Consolidated Telephone Co., Moultrie, on Sept. 4 was granted authority by the Georgia Public Service Commission to put the following rates into effect for Meigs and Ray City upon cut-over to automatic dial service:

Meigs—

Class of Service	*Rate per Month*
Business, individual line	$4.00
Business, 2-party line	3.50
Residence, individual line	2.75
Residence, 2-party line	2.25
Rural, multi-party line	2.25

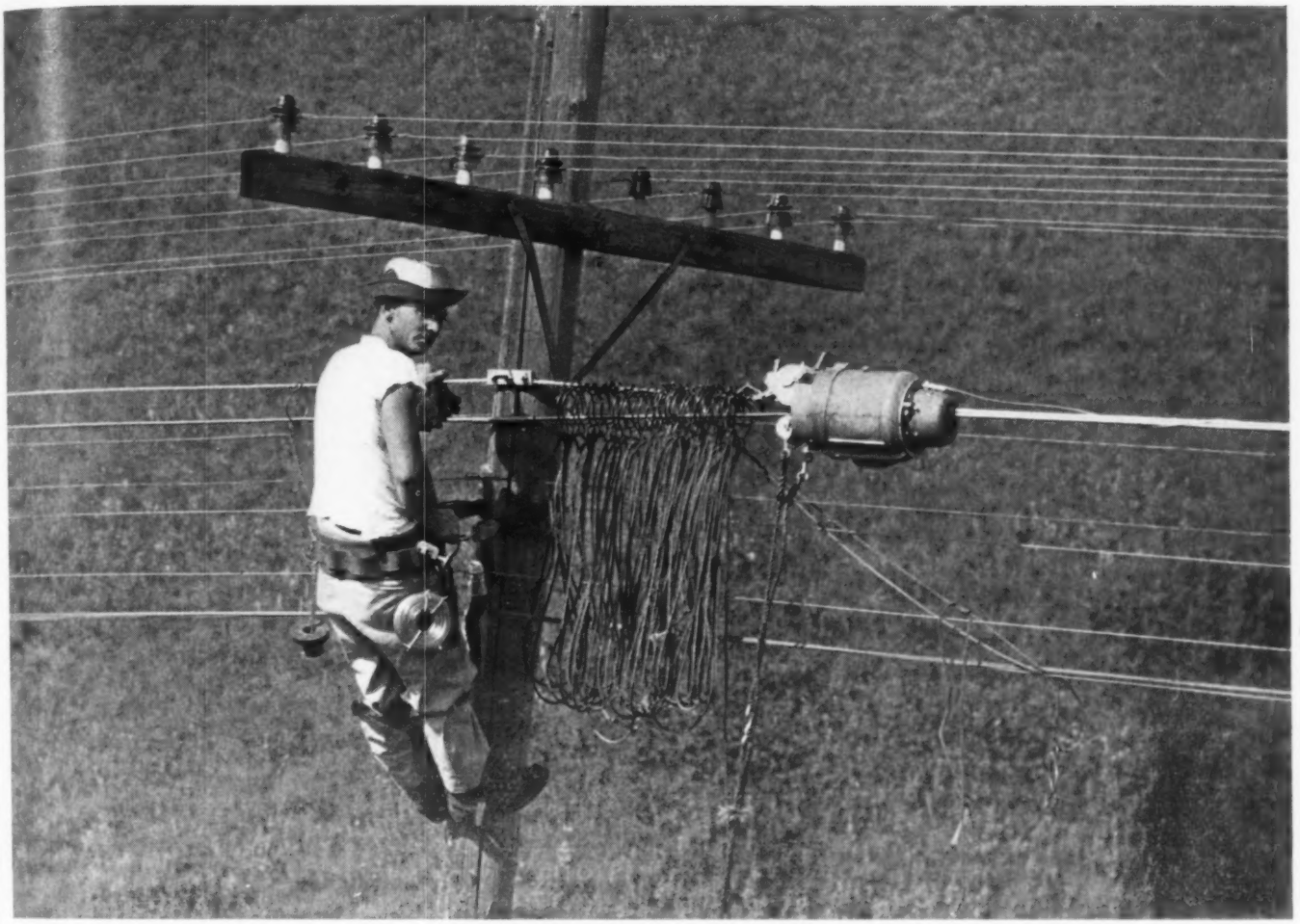
Ray City—

Class of Service	*Rate per Month*
Business, individual line	$3.50
Business, 2-party line	3.00
Residence, individual line	2.50
Residence, 2-party line	2.00
Rural, multi-party line	2.00

V V

Buys Oklahoma Exchange

S. R. Flynn has purchased the Fittstown, Okla., exchange of the National Telephone Co. from Don Crowder, according to notification received by B. Richardson, telephone engineer, Oklahoma Corporation Commission.



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Dismiss Oklahoma Rate Adjustment Applications

Application of citizens of Stigler, Okla., for adjustment of business and residence rates by the Southwestern Bell Telephone Co., and of W. A. Delaney, Jr., and others of Ada, for installation of dial service there have been dismissed.

The adjustments requested in the two applications will be considered in connection with the state-wide rate case filed Oct. 2, by the Southwestern Bell Telephone Co.

V V

Kentucky Independent Asks $99,600 Rate Increase

The Ashland (Ky.) Home Telephone Co., serving 17 eastern Kentucky cities, petitioned Sept. 30 for Kentucky Public Service Commission approval of a $99,600 a year rate increase.

Charles E. Whittle, commission chairman, immediately suspended the new rate schedule, but company officials said they would post a $50,000 bond and make the new tariffs effective Oct. 21. The company is authorized by state law to do this.

L. O. Evenson, vice president and general manager of the company, said the present rates have been in effect since 1936.

V V

Wisconsin Telephone Co. Seeks Additional Increase

Increases from 60 to 85 cents a month in residence telephone rates in Milwaukee are proposed in a new schedule announced Sept. 26 by the Wisconsin Telephone Co.

In 91 other state communities, residence rate increases of from 25 to 90 cents a month are planned.

The Wisconsin Public Service Commission Sept. 18 allowed the company to boost rates to give it $6,400,000 additional annual income and the new rates are fixed to accomplish this. (TELEPHONY, Oct. 4, p. 22.) However, the company had asked an income boost of $9,500,000 and it is understood it will request a further increase.

V V

Grants Higher Rates

The Nebraska State Railway Commission has granted the application of the Staplehurst (Neb.) Telephone Co. to increase rates 25 cents per month.

V V

Hearing on Rate Increase

Fred Boshear, doing business as the Richfield (Idaho) Mutual Telephone company, applied Sept. 19 to the Idaho Public Utilities Commission for a certificate of convenience and necessity. The commission set a hearing for Oct. 20 at Boise.

V V

Missouri Independent Asks First Increase in 30 Years

The Capital City Telephone Co., Jefferson City, on Sept. 29 asked the Missouri Public Service Commission for an increase in rates to meet the increased costs of operation and maintenance.

The increase in rates is the first asked by the company since 1918. "We have operated as long as we can on the rates set 30 years ago," Foster B. McHenry, president and general manager of the company, stated.

The increase asked by the company would amount to $52,059 annually, according to the application. Labor costs alone have increased $42,567 during the past 12 months, the petition set forth.

The new rates, if approved by the commission, would provide for an increase in the residential private line rate from $2.60 to $2.85 a month. Those with residential party lines would pay $2.15 instead of $1.99 as at present. Business private lines would be increased from $3.62 to $4.50.

An inventory of the company made by the commission in December, 1942 placed a valuation of $747,810.14 on the telephone property. Since that time the company has made additions to the plant in the amount of $104,379.60, the application stated.

V V

New Rates Give Oregon Co. $39,911.25 in Annual Revenue

Rates which will provide the Linn County Telephone Co. of Lebanon with an annual revenue of $39,911.95 were approved Sept. 16 by the Oregon Public Utilities Commissioner. They became effective Oct. 1. (TELEPHONY, Aug. 23, p. 22.)

When ordered to justify its proposed increases, the company disclosed that the net operating income for the first six months of 1947 was $1,519.52, that plant expansion from Jan. 1, 1947 to June 30, 1947 was $74,246.70, that additional plant expansion to be completed by Dec. 31, 1947 will amount to $46,297.80, that depreciation will be increased by $5,983.15 annually, and operating taxes will be raised by $4,000 a year.

V V

Approves Property Acquisition

Acquisition by the Pennsylvania Telephone Corp., Erie, of all telephone property and rights of the Vinton Coal & Coke Corp. was approved Sept. 15 by the Pennsylvania Public Utility Commission.

Tennessee Commission Ends Southern Bell Rate Hearing

Concluding an 11-day hearing on petition of the Southern Bell Telephone & Telegraph Co. for a 16 per cent intrastate rate increase, the Tennessee Railroad & Public Utilities Commission directed the company to submit a final brief before Oct. 25. (TELEPHONY, Aug. 16, p. 35.)

The company's final witness was B. S. Gilmer, development and revenues engineer, who said the company now was losing money on new telephones installed in the state. He said that between last Mar. 31 and Aug. 31, the company installed 13,847 new telephones. Figuring each as having an annual revenue value of $60.24, they would produce $834,144, he pointed out.

Making the same kind of computation for expenses, which he estimated at $63.71 per telephone, the added units would result in an expense of $882,336, or $48,192 more than revenues, Mr. Gilmer said.

Other testimony was given by the Tennessee Hotel Association, which earlier became a party to the case by filing an intervening petition.

George Thomas, president of the Tennessee Hotel Association, testified that a hotel in Nashville which he operates paid Southern Bell $16,498 a year in telephone charges, but collected only $15,208.

A. H. Lair, an accountant testifying for the hotel group, said that 24 Tennessee hotels which replied to a questionnaire said they operated their exchanges at a loss of $24,424. They paid the telephone company $559,329 last year, he said.

V V

Georgia Commission Opens Southern Bell Rate Hearings

The Georgia Public Service Commission Oct. 1 opened hearings on a plea by the Southern Bell Telephone Co. to increase rates $3,763,000 annually. (TELEPHONY, Sept. 13, p. 27.)

The company first requested a rate increase last November, and after a strike and a general wage increase last May, amended its petition.

Increases asked would range from 50 to 65 cents a month on residential telephones and from $1.25 to $2.75 on business telephones, depending on the size of the city.

V V

C&P of Virginia Rate Hearing Set for Nov. 5

Hearing on a petition of Chesapeake & Potomac Telephone Co. for authority to increase its rates in Virginia was set formally by the Virginia Corpora-

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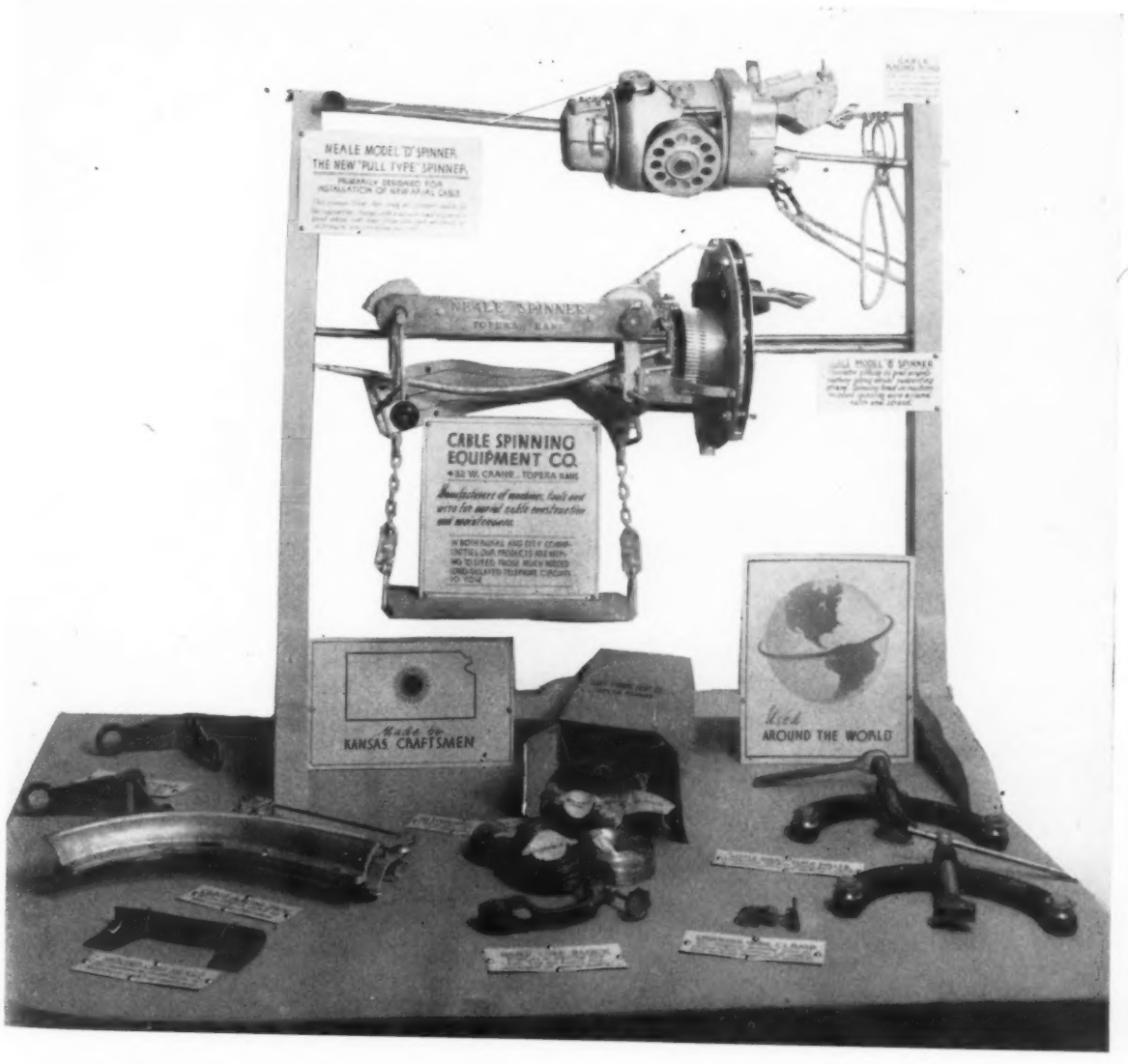
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tion Commission for Nov. 5. (TELEPHONY, Aug. 23, p. 20.)

In the same order, the commission directed that the new rates, which are approximately 25 cents per month more, be held in abeyance until Dec. 31.

V V

Rhode Island Rate Advance Postponed

A postponement of at least 60 days in the New England Telephone & Telegraph Co.'s proposed higher rate schedule of approximately 18 per cent was agreed upon at Providence, R. I., on Oct. 2 at which time it was to have gone into effect. (TELEPHONY, Sept. 13, p. 27.)

Rate hearings were to be resumed on Oct. 6 and the administrator hoped to finish these in time for a decision by Dec. 3. Hearings began in September, but were recessed to permit the staff of Laurence J. Hogan opportunity to examine the telephone company's records and evidence. The company of its own volition requested that the rates in its new schedule be pared down to the former level for the 60-day period.

V V

Summary of Commission Rulings & Hearings

California Public Utilities Commission

Sept. 29 : Hearing on application of Willits Telephone & Telegraph Co., Covelo, for an emergency rate increase.

Illinois Commerce Commission

Oct. 7: Hearing on motion of ICC against the Suburban Telephone Co., Dunlap, citing the respondent to show cause why the service at Alta should not be rehabilitated, corrected and maintained to provide satisfactory service.

Oct. 7: Hearing on petition of Illinois Central Telephone Co., Clinton, for approval of a revised schedule of exchange and toll service rates and elimination of certain free toll and flat rate toll services.

Oct. 7: Hearing on application of the Tampico (Ill.) Farmers Mutual Telephone Co. for increased rates.

Oct. 8: Hearing on application of Illinois Bell Telephone Co. for rate increases additional to those now on file and under suspension and for authority to make such additional raises effective without requiring 30 days' notice.

Kansas Corporation Commission

Oct. 20: Hearing on application of Edna (Kan.) Telephone Co. for authority to change rates.

Oct. 21: Hearing on complaint of Arthur Vopat and Rose Stepanek against the Home Telephone Co. of Geneseo regarding change of service by reason of respondent's failure to supply requested service.

Oct. 21: Hearings on applications of Scranton (Kan.) Telephone Co. and the Allen (Kan.) Telephone Co. for increased rates.

Oklahoma Corporation Commission

Oct. 22: Hearing on application of the Geary (Okla.) Telephone Co. for increased rates.

Oct. 22: Hearing on application of Alma (Okla.) Telephone Co. for increased rates at Alma and Pike City.

Oct. 22: Hearing on application of Ninnekah (Okla.) Telephone Co. for increased rates.

Oct. 29: Hearing on application of Spencer (Okla.) Telephone Co. for increased rates.

Nov. 11, 12: Hearing on application of Woodford (Okla.) Telephone Co. for increased rates.

Nov. 11, 12: Hearing on application of Otto Colvin for authority to purchase the Ardmore-Graham toll line and the Graham (Okla.) Telephone Exchange.

Dec. 30: Application of B. Richardson, telephone engineer, citing the Western Light & Telephone Co. of Kansas City, Kan., to show cause why it should not improve toll service between Oakwood and Watonga, Okla. Continued from Sept. 19 to give company time to complete construction of a new line.

Jan. 20, 21, 22, 1948: Hearing on application of Southwestern Bell Telephone Co., for increased rates, to be adjusted among its 143 exchanges.

Nebraska State Railway Commission

Nov. 3: Hearing on application of the Kenesaw (Neb.) Telephone Co. for an increase in rates.

Nov. 12: Hearing on application of the Hamilton County Farmers Telephone Corp., Aurora, for increased rates.

New York Public Service Commission

Oct. 6: Hearing on complaint of the Walton Chamber of Commerce against the service, equipment and appliances of the Delaware Telephone Co., Inc., of Walton.

Pennsylvania Public Utilities Commission

Oct. 10: Hearing on complaint of Mary K. Ward v. the Bell Telephone Co. of Pennsylvania, alleging that respondent improperly discontinued complainant's telephone service.

V V

Northwestern Bell Director

P. J. Donnelly, Grafton, N. D., grain, beet and seed potato producer, has been elected to the board of directors of the Northwestern Bell Telephone Co., Russell J. Hopley, president of the company, announced recently.

Answers to Traffic Questions on Page 23

(1) The operator should say, "Shall I give you Information?"

(2) The first thing the operator should say is, "I beg your pardon" to apologize for the error.

(3) Yes, indeed.

(4) Yes, if the management of your company sanctions this practice.

(5) "I'm sorry but we do not give out the time."

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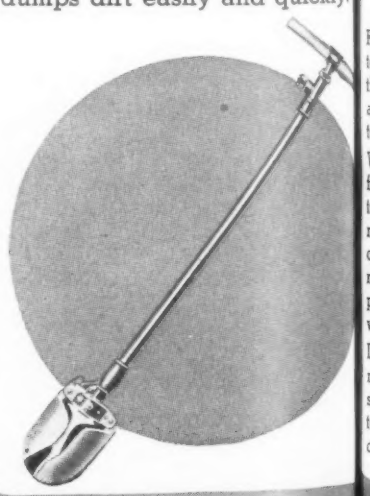

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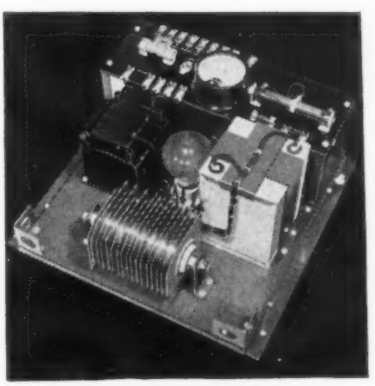
For more than ten years, leading independent telephone companies have found that Raytheon Rectifilters are the most economical and efficient way to supply steady DC power to PBX boards directly from an AC source.

With no moving parts, the Raytheon Rectifilter requires neither adjustment nor maintenance. It will outlast many sets of batteries, release wires carrying charging current from central office to subscribers' PBX boards for revenue producing service, and minimize power cost because of high efficiency in converting from AC to DC.

Dry disc rectifying units and other components are designed for long-life, trouble-free service. The Raytheon Rectifilter will end your telephone power problems. Just plug it in, close the door—and forget it!



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central office protector

Combines cable termination with protection of central office personnel and equipment against high potentials and sneak currents. In operation, it opens the switchboard circuit, grounds the outside line, and operates an alarm circuit. Note these construction and operating features:

1. Provides for temporary disconnect.
2. Self-soldering, low-resistance heat coils easily reset after operation without changing, reversing or re-soldering coils.
3. Line and switchboard connections on opposite sides of protectors.
4. Steel mounting plate for maximum strength.
5. Unit dischargers, consisting of two carbons, separated by acetate dielectric cemented together, permanently grounds the outside line under continuous discharge.
6. Easily tested without removing heat coil; withdrawal of test plug leaves protector in operating condition.

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ROCKY MOUNTAIN GROUP HOLDS FIRST MEETING

[EDITOR'S NOTE: *We appreciate the cooperation of Daniel H. McNulty, president of Telephone Repair & Supply Co., Chicago, for furnishing the information for the following report of the Rocky Mountain convention.*]

* * *

SIXTY-ONE telephone men and women from six Rocky Mountain area states met in Salt Lake City on Sept. 22 and 23 for the first annual convention of the recently formed Rocky Mountain Telephone Association.

The association was organized Apr. 28 at a meeting in Salt Lake City, attended by 35 representatives from Arizona, Colorado, Idaho, New Mexico, Utah and Nevada. To the first president of the association, R. R. Mann, Nunn, Colo., goes the major credit for the organization of the association as he began activity to form such a group late last year. From the start he had an enthusiastic response from Independent telephone companies and all recognized the need for an association through which they could protect their interests and "pool" their resources in an effort to improve and expand telephone service in the Rocky Mountain territory.

The first day of the convention was given over to reports of officers and an address by J. T. Tierney, Denver, Colo., general sales manager, Mountain States Telephone & Telegraph Co., who spoke on "M-1 Carrier System and Mobile Telephone Service."

President Mann then read a memorandum from Clyde S. Bailey, Washington, D. C., executive vice president, United States Independent Telephone Association, in which he outlined the various pieces of federal legislation on which the national association has been active in supplying information to congressional committees and governmental bureaus.

Mr. Bailey emphasized the following five major problems confronting the industry and urged that concerted effort be applied by telephone companies to solve them:

(1) Taking care of the backlog of held orders for telephone service.
(2) Expanding plant under present equipment and labor shortages.
(3) Continued and unabated rise in operating expenses.
(4) Improving labor relations.
(5) Obtaining necessary rate adjustments.

The program of the last day of the convention included addresses on "Toll Plans," by D. A. McLean, Denver, commercial toll engineer, Mountain States Telephone & Telegraph Co., and "Public Utility Regulation" by Wilford A. Robinson, Salt Lake City, engineer, Utah Public Service Commission.

R. R. MANN

An entertainment program for women attending the convention included an organ recital, a tour of Salt Lake City and a luncheon at the Salt Lake Country Club. Serving as hostesses were Mrs. Franklin D. Sawyer, Mrs. Victor P. Schmit and Mrs. John E. Buckwalter.

The association voted to hold the 1948 convention in Denver.

Officers of the association, in addition to Mr. Mann are: Vice President, Clive W. Haas, Big Timber, Mont., and secretary-treasurer, Fred C. Janzen, Rockland, Idaho.

Directors include: Ward W. Blazzard, Kamas, Utah; F. C. Brown, Chinook, Mont., T. Clark Callister, Fillmore, Utah; J. W. Corbin, Moab, Utah; R. B. Fairley, Lubbock, Tex.; Clive W. Haas, Big Timber, Mont.; C. M. Hart, Kingman, Ariz.; Fred C. Janzen, Rockland, Idaho; Osborne Low, Afton, Wyo.; Richmond R. Mann, Nunn, Colo.; D. A. McLean, Denver, Colo.; Richard R. Olsen, Holbrook, Ariz.; E. M. Sargent, Espanola, N. Mex.; Harper Saunders, Wilder, Idaho; Victor D. Wright, Strasburg, Colo.

V V

Plan Coatsburg Reorganization

A survey to determine the desire of Coatsburg residents to membership in the proposed incorporation of the Coatsburg (Ill.) Mutual Telephone Exchange now is being conducted. Incorporators named are Edward Kuntemeir, William Wellman, Albert Shanholtzer, Earl Dralle and Chester Guenther.

V V

Gulf States Company Starts Expansion Program

The Gulf States Telephone Co., with general offices at Tyler, Tex., in conformity with its postwar plans started during 1944, has embarked on an extensive three to five-year improvement and expansion program.

In 1914 the company inaugurated its present policy of submitting to its subscribers a petition for their approval, or rejection, on any proposed improvement program that involved an increase in rates.

Most recent conversions to unattended dial operation were its exchanges at Seagoville and Crandall, with the control center at Kaufman. A new and modern brick structure was erected at Seagoville to house the equipment which now serves 319 stations, a gain of 83 stations since August, 1944. A smaller semi-fire-proof building houses the new equipment at Crandall which serves a total of 126 stations, a gain of 37 stations since August, 1944.

The new system at both of the above exchanges has greatly accelerated both toll and local business at these points. Several other exchanges will be cut over to dial operation within the next two years.

The Gulf States Telephone Co. was founded in 1901 by Judge S. A. Lindsey who is still its president.

V V

Huntsville, Ark., Exchange Sold to J. W. Holt

Sale of the Madison County Telephone Co., Huntsville, Ark., by Mrs. Loma Northcross to J. W. Holt of Stilwell, Okla., recently was announced. Mr. Holt has named Mr. and Mrs. C. D. Bennett, formerly of Oklahoma, to manage the Madison County company.

The new owner has been in the telephone business approximately 35 years, 20 of which were spent in Stilwell where he owns and operates the Stilwell (Okla.) Telephone Co. Other telephone property in Missouri is owned jointly by Mr. Holt and his son.

V V

Illinois Commercial Managers

Mr. and Mrs. J. P. Cordray, Bethany, Ill., have been appointed new operators of the Melvin exchange of the Illinois Commercial Telephone Co.

Obituaries

FRED H. VANTUYL, 71, traffic manager of the Jamestown (N. Y.) Telephone Corp., died recently following a heart attack. A resident of Jamestown for 50 years, he had joined the telephone company at the time of its organization in 1919. He was a member of the Upstate Empire Chapter of the Telephone Pioneers of America.

• • •

GEORGE A. RICE, 54, president of the Rochester (N. Y.) Telephone Employes Association, and an employe of the Rochester Telephone Corp. for the last 30 years, died Sept. 30 in his home. He was a member of the Genesee Chapter, Telephone Pioneers of America.

V V

Boshart Appointed

I. J. Devoe, general auditor of the Lincoln (Neb.) Telephone & Telegraph Co., recently announced the appointment of Kenneth J. Boshart as assistant supervisor of revenue accounting and assistant to the traveling auditor. Mr. Boshart has been with the company for 19 years, except for three years in army service.

COMING CONVENTIONS

United States Independent Telephone Association, Stevens Hotel, Chicago, October 14, 15 and 16.

Virginia Independent Telephone Association, Hotel Roanoke, Roanoke, October 30 and 31.

Florida Telephone Association, Orange Court Hotel, Orlando, November 3 and 4.

South Carolina Independent Telephone Association, Jefferson Hotel, Columbia, November 6 and 7.

Georgia Telephone Association, Henry Grady Hotel, Atlanta, November 10 and 11.

Alabama Independent Telephone Association, Jefferson-Davis Hotel, Montgomery, November 13 and 14.

Missouri Telephone Association, Governor Hotel, Jefferson City, November 17 and 18.

North Carolina Independent Telephone Association, Pine Needles Hotel, Southern Pines, November 20 and 21.

Oklahoma Telephone Association, Huckins Hotel, Oklahoma City, December 4 and 5.

For more than 45 years the famous STEPHENS Climbers have been exclusively manufactured by

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of Binghamton

and in that time one objective has been constantly kept in mind—to maintain the same high quality standards established by Wilmot Stephens when he first forged climbers on a blacksmith's anvil almost a half century ago.

Extreme care is taken to provide safe, comfortable equipment, and every article is inspected to comply with the exacting requirements established by safety engineers.

Buckingham "Cushion Deluxe" Floating Tool Belt No. 58 is made from the best latigo and chrome leathers. It has the "rolled edge" feature that gives a cushion effect with the greatest comfort to the wearer. Rigidly tested for strength and safety.

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- Each climber tested for toughness and strength of gaff rivet.
- Each climber Parkerized (rust proofed) and lacquered.

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BELL DEMONSTRATES PCM TECHNIQUE

A RADICALLY new communications technique for long distance telephone transmission was given its first public demonstration on Oct. 1 by engineers of Bell Telephone Laboratories where the new art is under development.

Known as PCM, an abbreviation for pulse code modulation, the new technique is entirely different from earlier forms of pulse modulation and promises marked freedom from noise and interference, it is said.

A special demonstration program illustrating the remarkably clear transmission which the new system affords was brought over telephone lines from the Bell Telephone Laboratories' research buildings at Murray Hill, N. J., where the equipment is installed, to the auditorium of the Engineering Societies Bldg. in New York City.

There, at a meeting of the New York section of the Institute of Radio Engineers, several hundred engineers heard the program and an explanation of the new technique. Both speech and music were sent over the new system and reproduced through loudspeakers in the auditorium.

The new technique is expected to find use on broadband transmission hook-ups, including microwave radio relay systems, such as that now being installed to link New York and Boston. Basically it is a method of transmitting the human voice by various patterns or codes of electrical impulses.

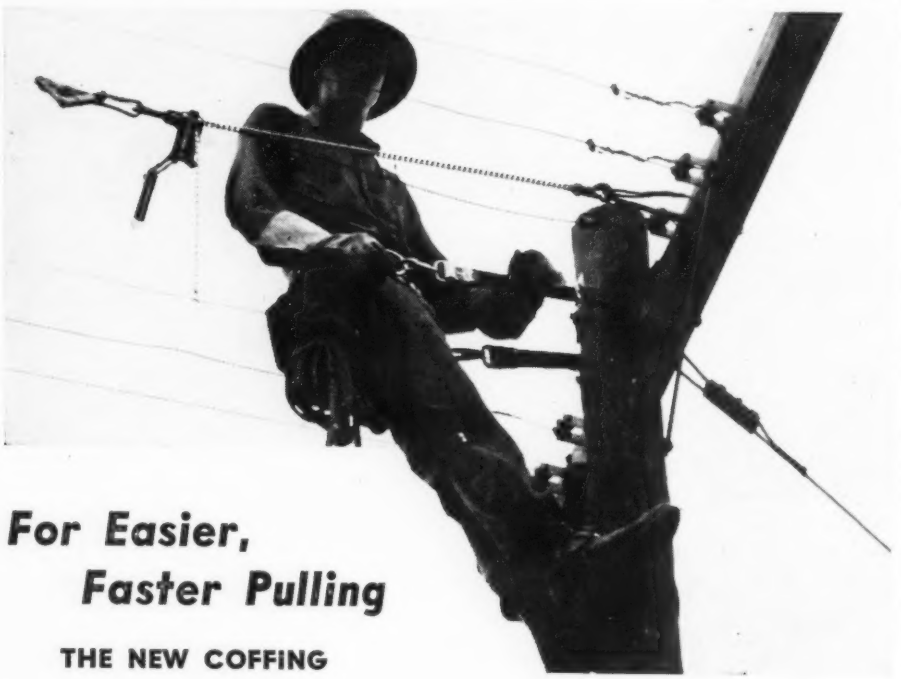
A revolutionary new vacuum tube which electronically converts the human voice into these patterns or codes was also displayed for the first time at the meeting. In a 96-channel laboratory model now under development, such Bell laboratories tubes will handle code signals at the incredible speed of 5,376,000 pulses per second.

Although the new system is expected to be used primarily as an adjunct to the telephone network, it can also be used to transmit radio programs, pictures, and teletypewriter signals.

The demonstration was given by L. A. Meacham and Eugene Peterson of the technical staff of Bell Telephone Laboratories, both of whom have been active in the development of the system. The coding tube was described by R. W. Sears, also of the laboratories technical staff, who designed and developed it for use in the system.

The new technique overcomes one of the difficulties of long-distance radio systems, namely, the building up of noise with each of the many amplifications needed for a long-distance radio hook-up. With PCM, an entirely new approach to the problem is provided by the use of special amplifiers in which the signal code is reconstructed during each amplification. Thus, no matter how many amplifiers are used, the PCM signal is received with its original quality.

Pulse modulation, or sampling, transmission in general is expected to be used on broadband communications systems on which many conversations can be carried simultaneously. Such transmission is so named because the continuous speech wave is sampled very briefly and rapidly and only information regarding these samples is transmitted. For a standard telephone circuit 3,000 to 4,000 cycles in width, samples taken at the rate of 8,000 per second are adequate. Just these brief



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It will help to speed almost any wire tensioning or pulling job; only 28 pounds of effort needed for a 500 pound pull. Safety tested to 100% overload—the "Safety-Handle" is designed to bend before any other part gives way; thus prevents dropping load. Put it to work today . . . for greater efficiency.

Ask your distributor or write direct for Bulletin TMP-I—shows an amazing variety of uses for the "Mighty-Midget."

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samples are sufficient to reconstruct the original wave with high fidelity.

Since information regarding the sample can be sent very quickly—in roughly a millionth of a second—the system can carry not just one but many different telephone conversations, each of which is sampled in turn and then reassembled at the receiving end. Thus, a transmission system of this type actually carries a sample from one conversation, then from another and so forth, repeating the sampling cycle through as many conversations as are being transmitted.

Several pulse methods have been available by which information regarding the sample can be transmitted. One method, known as PAM for pulse amplitude modulation, sends a sample amplitude directly. Another, known as PPM for pulse position modulation (and also as PTM for pulse time modulation), varies the time with respect to a reference time at which pulses of uniform amplitude and duration are sent. This conveys variations in amplitude. Still another, known as PWM or PLM, for pulse width or length modulation, conveys amplitude by the length of time the pulse lasts.

PCM accomplishes this by using a set of patterns or codes, each one of which conveys specific information about the sample which it represents. Each of these patterns consists of an arrangement of electrical pulses which always contains a definite and constant number of pulses. These pulses are either "on" or "off," that is, present or absent. Thus, as long as these groups of simple on-off pulses are received properly, speech sent over PCM is reproduced perfectly.

The more code-patterns there are available, the more faithfully the voice wave can be reconstructed at the receiving end. Experiments have shown that patterns or code-groups using six or seven pulses assure high quality transmission. The system demonstrated employs code-groups of seven pulses. By using different combinations of these seven pulses, 128 separate codes are available. During the demonstration the improvement of quality with the addition of pulses was shown by transmitting first with only a one-pulse system and then adding others one at a time.

The coding tube—actually an electronic brain that operates so quickly no human brain could hope to compete with it—is not impressive in size. It stands only 10 ins. high, is a couple of inches across, and at first sight looks like almost any oversized radio tube.

All the 128 codes available in the seven-pulse code-group are perforated

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in appropriate order in a special plate inside the tube. This plate is so placed that a beam of electrons can sweep across the seven elements of any one code-group. Which one it actually sweeps across is determined by the position of the beam, and this in turn is determined by the amplitude of the signal at the time of sampling.

If the beam goes through a hole in the perforated plate, the pulse is an on-pulse; if the beam is blocked because there is no perforation at that point, it is an off-pulse. The irregular, machine-gun-like pattern of on and off pulses carries the information concerning the amplitude sample to the receiving station.

V V

H. C. Beal Named Bell Laboratories Director

Henry C. Beal, vice president of the Western Electric Co., has been elected a director of Bell Telephone Laboratories to succeed C. G. Stoll, recently retired president of Western Electric.

Entering Western Electric from Purdue University in 1914, Mr. Beal rose through successive grades in manufacturing, planning and industrial relations to become works manager at Kearny in 1939. Three years later he became engineer of manufacture, and recently vice president.

Modulation in Communications

(Continued from page 17)

acceptable values. With "yes or no" telegraph type signals higher values of interchannel interference are permissible without serious reaction. Thus time division systems have been widely used in telegraphy. Time division is also coming into use in telephony when speech is converted to pulse position, pulse code or similar signals.

Comparison of Modulation Systems

The determination of the desirable type of modulation or transmission system depends upon many interrelated factors which vary widely with the condition of application. Some of these are:

Length of system — more complex terminal or modulating system can be justified for long wire systems.

Relative availability of frequency space.

Variation of cost of transmission system with frequency band width.

Type of signals.

Ratio of minimium required frequency band to that practically necessary allowing for filters and frequency stability.

Desired fidelity or performance.

Nature of transmitting medium.

Each type of modulating system in general use has some feature which recommends its use under some conditions and not under others.

For most systems of modulation improved performance may be gained by utilizing a wider frequency band. This improvement generally is reduced when high values of noise or interference are present. With certain types of noise there is a tendency toward encountering this limitation more frequently as the frequency band is widened.

One outstanding exception to the rule of improvement accompanying increased band width is a single sideband transmission system, when an improvement of about nine db with respect to a double sideband amplitude modulated system may be obtained. This is about the same improvement as would be obtained by the use of frequency modulation employing 2½ times the band width of a single sideband system.

The qualifications which are necessary to accompany even these simple generalizations are an indication of the difficulty of attempting to determine the appropriate form of modulation for a given set of conditions without careful study.

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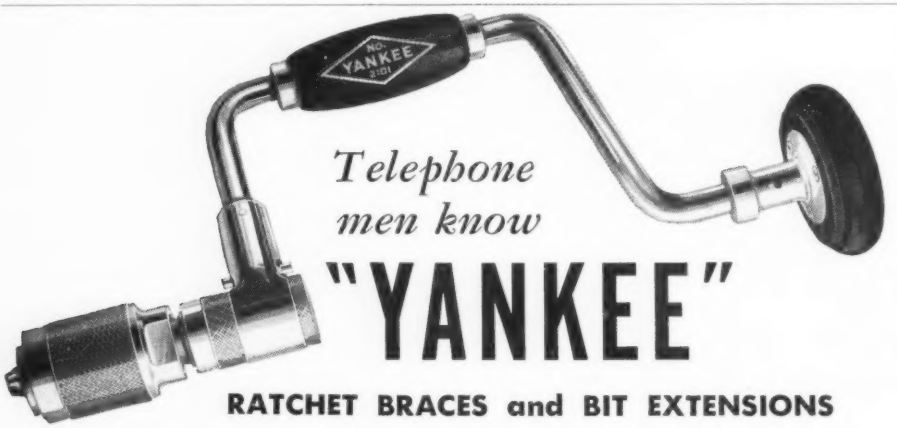

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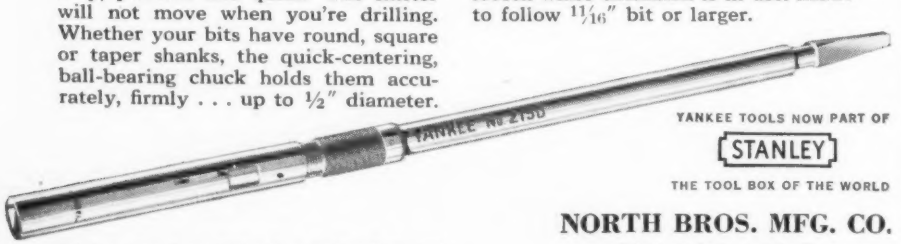

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3. All metal parts are rust-proofed, the one piece drawn metal hood is hot-galvanized, and the terminal as a whole is completely weatherproof.

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(The foregoing is a paper presented before the summer meeting of the American Institute of Electrical Engineers.)

V V

Associated Employes Honor C. F. Mason

A tribute to C. F. Mason, chairman of the board of directors of Associated Telephone Company, Ltd., Santa Monica, Calif., in the form of a surprise party was sponsored by 400 employes of the company on Aug. 29, in honor of his retirement from active service in accordance with the company's pension plan.

Harlan W. Holmwood, vice president of the company, was selected master of ceremonies by the employe committee in charge of the party.

On behalf of the employes, Mr. Holmwood paid tribute to Mr. Mason "not as a chairman, not as our boss, but as our friend." He traced the history of the Associated company and told of Mr. Mason's leadership in developing the organization as a company with 640 employes in 1929 to one having 2,400 today, and with an increase in the number of exchanges from six to 23.

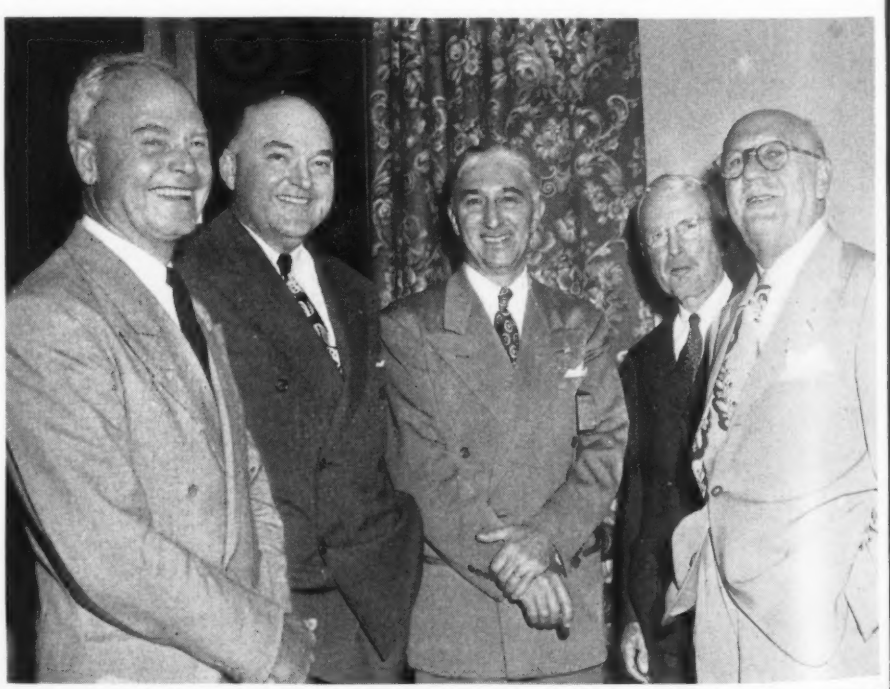
Mr. Holmwood introduced the "oldtimers" who were with the old Santa Monica Telephone Co. when Mr. Mason took over that company in 1924 and 16 retired employes who were seated at the speakers' table.

Other speakers were E. M. Blakeslee, who succeeded Mr. Mason as president upon the latter's retirement from that position; R. E. Easton, a director of the company, and A. R. Valantine, chairman of the employe committee which planned the party, who introduced members of his committee, representing every district of the territory served by the company.

Invited guests, pensioners, and members of the company's board of directors who were unable to attend the party sent letters and telegrams to Mr. Mason, expressing their regard for him. Following the reading of several of these, Mr. Holmwood introduced Ted Hunter, an old-time telephone man of more than 30 years, who presented Mr. Mason with an engraved wristwatch and album.

Photographs in the 100-page album, compiled by employes, are mounted on Belgian parchment, while the goatskin binding and inside fly leaves were imported from France. The book contains a photographic record of events from the time the Associated company was formed in 1929 until the present time. It is decorated with colorful illustrations, and contains a hand-colored map of the company territory and the dates of acquisitions. It also contains full-page charts of personnel increase and station growth. The last 20 pages are devoted to signatures of all of the employes in the company.

Mr. Mason expressed his appreciation to the assembly for the party and gifts. He reminisced with some of the "oldtimers" about bygone incidents, and gave fitting tributes to Mr. Blakeslee and Mr. Holmwood.



Officers and members of the Board of Directors of the Associated Telephone Co., Ltd., photographed at the party in honor of C. F. MASON. Left to right: GEORGE JONES, director; EDWIN M. BLAKESLEE, president; HARLAN W. HOLMWOOD, vice president; ROBERT E. EASTON, director, and MR. MASON.

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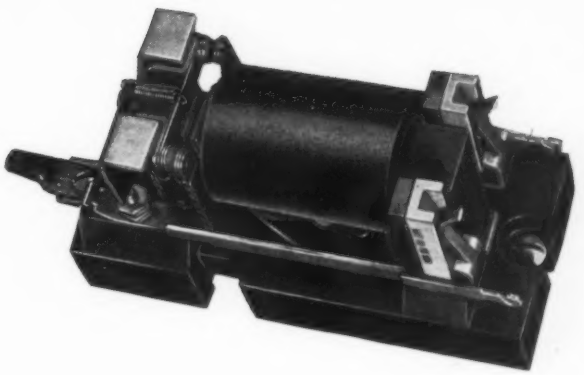

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Telephony, July 12, 1947

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Crothers Named Division Manager by C & D Batteries

A. L. Crothers has been appointed central division manager by C & D Batteries, Inc., Conshohocken, Pa., with offices in the Carnegie Hall Bldg., Cleveland, Ohio.

A. L. CROTHERS

He received his education in electrical engineering at the University of Virginia and the University of Maryland, graduating in 1929. Since that time, Mr. Crothers has been active in industrial sales in the Philadelphia, Baltimore and Cleveland areas.

Mr. Crothers has a thorough knowledge of batteries and charging equipment, coupled with a wide acquaintanceship in the industrial field.

C & D batteries for electric industrial trucks and mine locomotives, Diesel, marine, air-conditioning and car-lighting, telephone, auxiliary power, as well as starting and lighting batteries for automobiles, motorcycles, trucks, buses and other industrial equipment comprise the complete C & D battery line.

V V

Cook Issues Booklet On Research Laboratories

The Cook Electric Co., Chicago, Ill., has just issued a 34-page booklet on the objectives, personnel and facilities of its research laboratories.

The work of the laboratories, which is under the supervision of Dr. J. Robert Downing as director, is carried on by a supervisory staff of seven, an engineering staff of 10 and six consulting associates.

The administrative staff is composed of Walter C. Hasselhorn, president of the Cook company; John S. Baker, vice president in charge of engineering, and C. Ross Stewart, business manager of the laboratories.

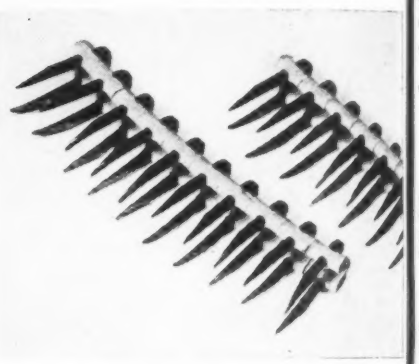
The booklet lists the members of the laboratories' staff and describes the research equipment and model shop facilities used in basic applied research, electronics and instrumentation.

According to the booklet, the objectives of the laboratories are to make research facilities available to government agencies and to help private industry prepare for widespread distribution of scientifically engineered products.

V V

New Ten Staple Strips For Low-Voltage Wiring

A new insulated staple for making telephone wiring installations has been announced by the Superior Mfg. Co., Fitchburg, Mass. The patented in-



sulated staples, packaged in strips of 10, are designed for easy and rapid handling. They drive easily, grip firmly and come in colors to match interiors and are distributed by Graybar Electric Co. in over 90 cities, according to the Superior company.

V V

Jaques Increases Output Of Earth Boring Machines

With the demand for power pole hole diggers growing rapidly, production of its hydraulic earth boring machine has been stepped up by the Jaques Power Saw Co., Denison, Tex., the company reports.

These earth boring machines, powered by Ford Mercury 100 hp independent power units, are now in service in Canada, Mexico, Argentina, Puerto Rico, Australia, and South Africa, as well as in practically every state in this country, it is stated.

Many of the units are being used by telephone and electric companies to dig pole holes. In addition, Jaques earth boring machines are being used for many other purposes, such as digging foundations, test holes for gravel, for transplanting trees, and for roughing out trenches for water and sewer mains.

Although the Jaques machines have been manufactured and sold commer-

cially for only three years, they are the result of nearly 20 years of testing and development, the company states. The Jaques company had completed its product development work and had arranged to manufacture them in quantity several years earlier, but the war intervened, and the company placed its productive capacity at the disposal of urgent production for the Army and the Navy.

The Jaques company, one of the leading manufacturers of earth boring and land clearing equipment, has greatly expanded and improved its line of machinery and equipment products since the war. Among the products manufactured by this company are the portable power saws, tractor-mounted power saws, portable post hole diggers, portable sawmills, farm tractors, bulldozers, blocks and tackles, and air-cooled engines.

STATEMENT OF OWNERSHIP

Statement of the ownership, management, circulation, etc., required by the Acts of Congress of August 24, 1912, and March 3, 1933, of TELEPHONY, published weekly at Chicago, Ill., for October 1, 1947.

State of Illinois, County of Cook, ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared Ralph C. Reno, who, having been duly sworn according to law, deposes and says that he is the editor of TELEPHONY and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Telephony Publishing Corp., 608 S. Dearborn St., Chicago 5, Ill.; editor, Ralph C. Reno, 608 S. Dearborn St., Chicago 5, Ill.; managing editor, Ralph C. Reno, 608 S. Dearborn St., Chicago 5, Ill., and business manager, H. D. Fargo, Jr., 608 S. Dearborn St., Chicago 5, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Telephony Publishing Corp., 608 S. Dearborn St., Chicago 5, Ill.; H. D. Fargo, 608 S. Dearborn St., Chicago 5, Ill.; H. D. Fargo, Jr., 608 S. Dearborn St., Chicago 5, Ill.; Ralph C. Reno, 608 S. Dearborn St., Chicago 5, Ill., and A. J. Stults, 608 S. Dearborn St., Chicago 5, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and secur-

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ity holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above is 7,772.

RALPH C. RENO.

Sworn to and subscribed before me this 22nd day of September, 1947.

ALBERT J. STULTS.

(My commission expires November 6, 1948.)

Issues "Penta" Booklet

The Chapman Chemical Co., 333 N. Michigan Ave., Chicago, Ill., has just issued a booklet describing the contents and applications of its "Penta" preservative for telephone poles to protect them from decay, fungi and insects.

The basic ingredient of "Penta" is pentachlophenol, a product of the Dow Chemical Co. Copies of the booklet may be secured by writing to the Chapman company.

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T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles, Plain or butt-treated.

Wood Products Co., American Bank Bldg., Portland, Ore.—Creosoted Douglas Fir, Larch, and Lodgepole Pine Poles.

Issues New Brochure

A new 12-page brochure, describing its diverter-pole motor-generators for the floating charge of telephone batteries and for all exchange direct-current requirements, has been issued by the Electric Products Co., 1725 Clarkstone Rd., Cleveland, Ohio. Copies of the booklet may be obtained by writing the company.

V V

Adams Joins Cope

T. J. Cope, Inc., Philadelphia, Pa., manufacturers of cable installation equipment, recently announced the appointment of Charles E. Adams as their agent covering the Western Pennsylvania and West Virginia territories. Mr. Adams, well known for the past 16 years as sales engineer for Hubbard Co., will handle the complete Cope line from his offices at 208 Kirby Bldg., Pittsburgh, Pa.

FOR SALE

FOR SALE: Generous line clearance service at flat mileage rates to specification. Minor maintenance reports on request. Rural goodwill expertly promoted. American Tree Craft, 607 Catherine St., Ann Arbor, Mich.

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